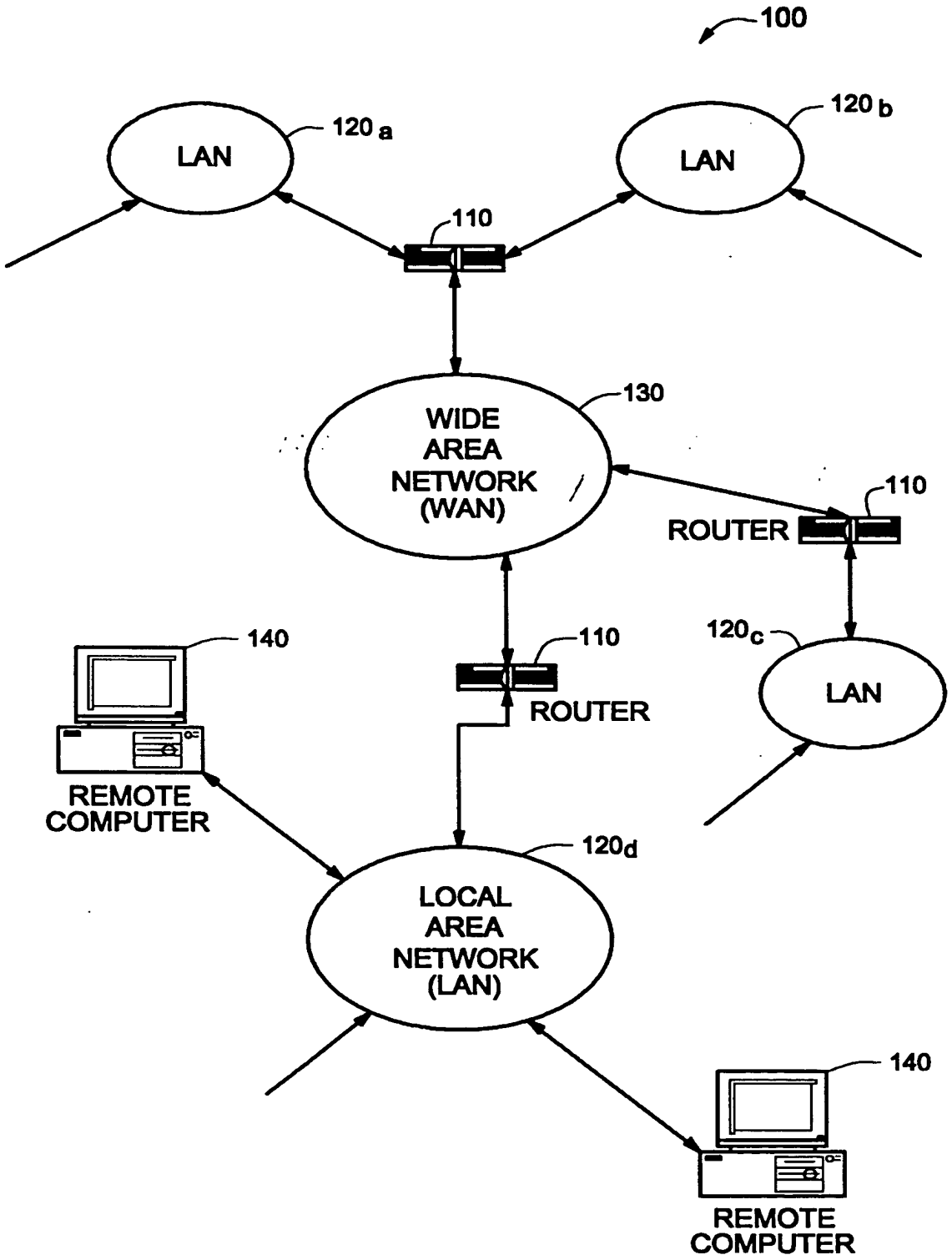

100
LAN
120 a
LAN
120 b
110
WIDE AREA NETWORK (WAN)
130
110
ROUTER
140
110
ROUTER
120c
LAN
REMOTE COMPUTER
120d
LOCAL AREA NETWORK (LAN)
140
REMOTE COMPUTER

Figure 1

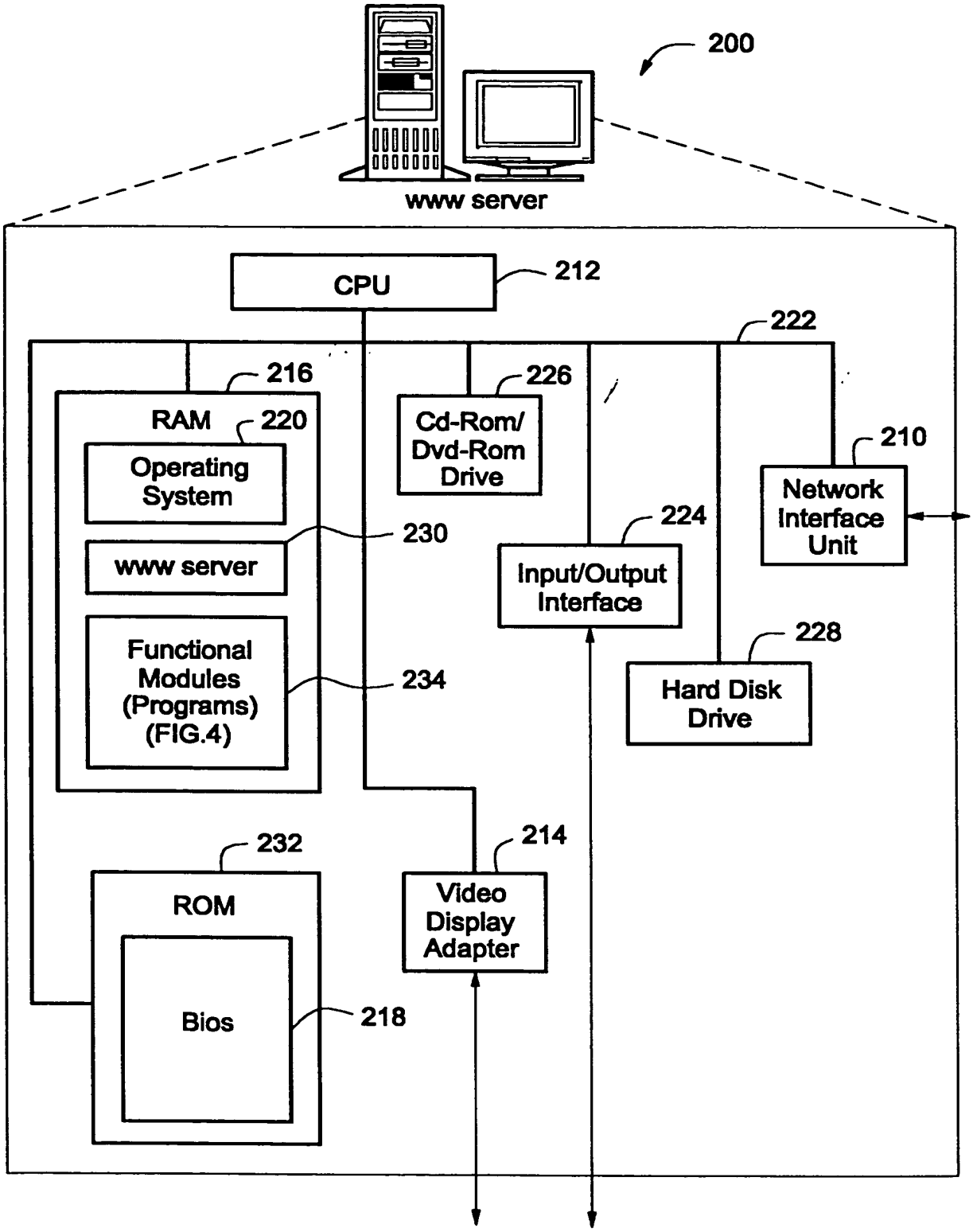

200
www server
CPU
212
222
216
226
RAM
220
Operating System
Cd-Rom/ Dvd-Rom Drive
210
Network Interface Unit
224
230
www server
Input/Output Interface
228
Functional Modules (Programs) (FIG.4)
234
Hard Disk Drive
232
214
ROM
Video Display Adapter
Bios
218

Figure 2

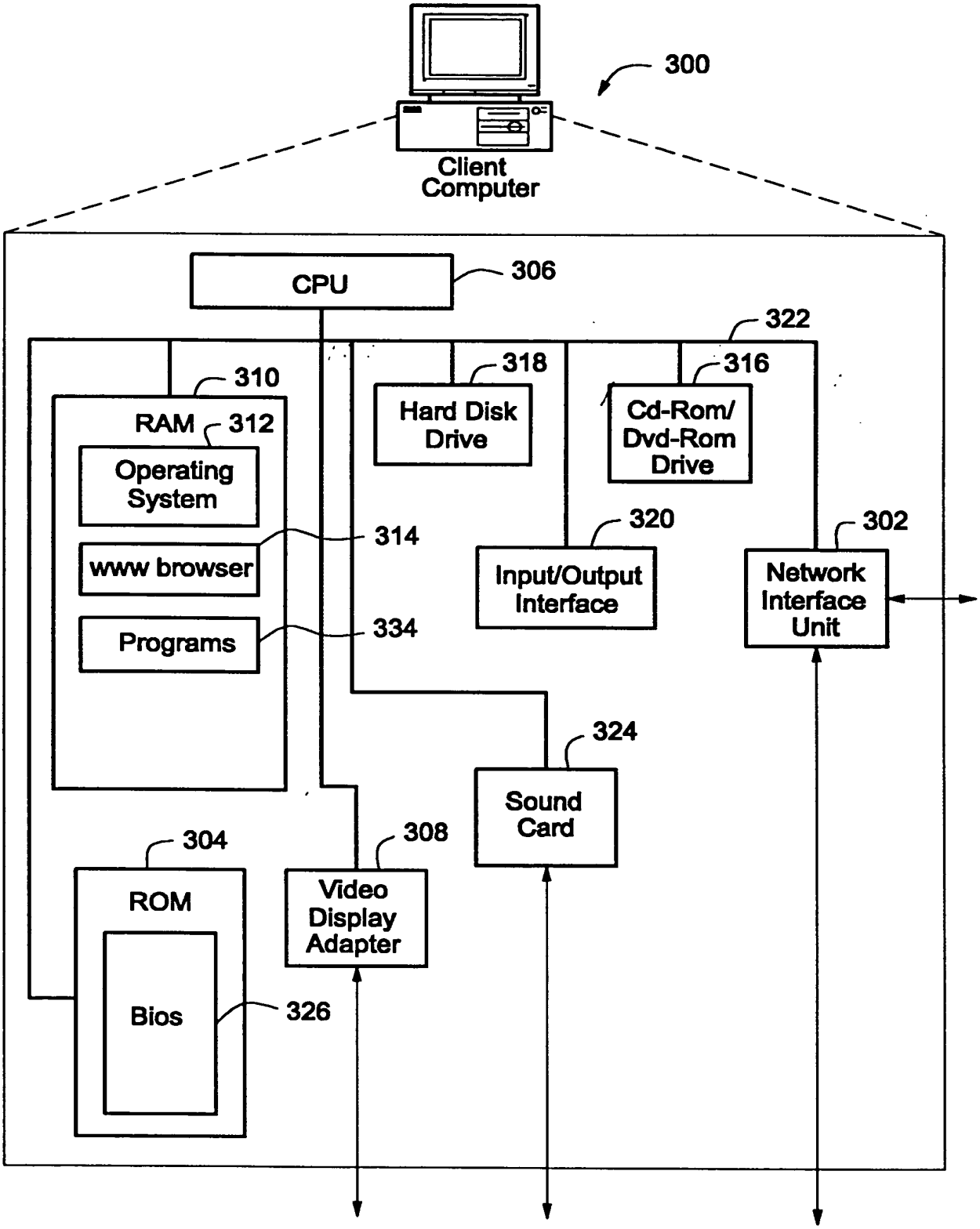

300
Client Computer
CPU
306
322
310
318
316
RAM
312
Hard Disk Drive
Cd-Rom/ Dvd-Rom Drive
Operating System
314
320
302
www browser
Input/Output Interface
Network Interface Unit
Programs
334
324
Sound Card
304
308
ROM
Video Display Adapter
Bios
326

Figure 3

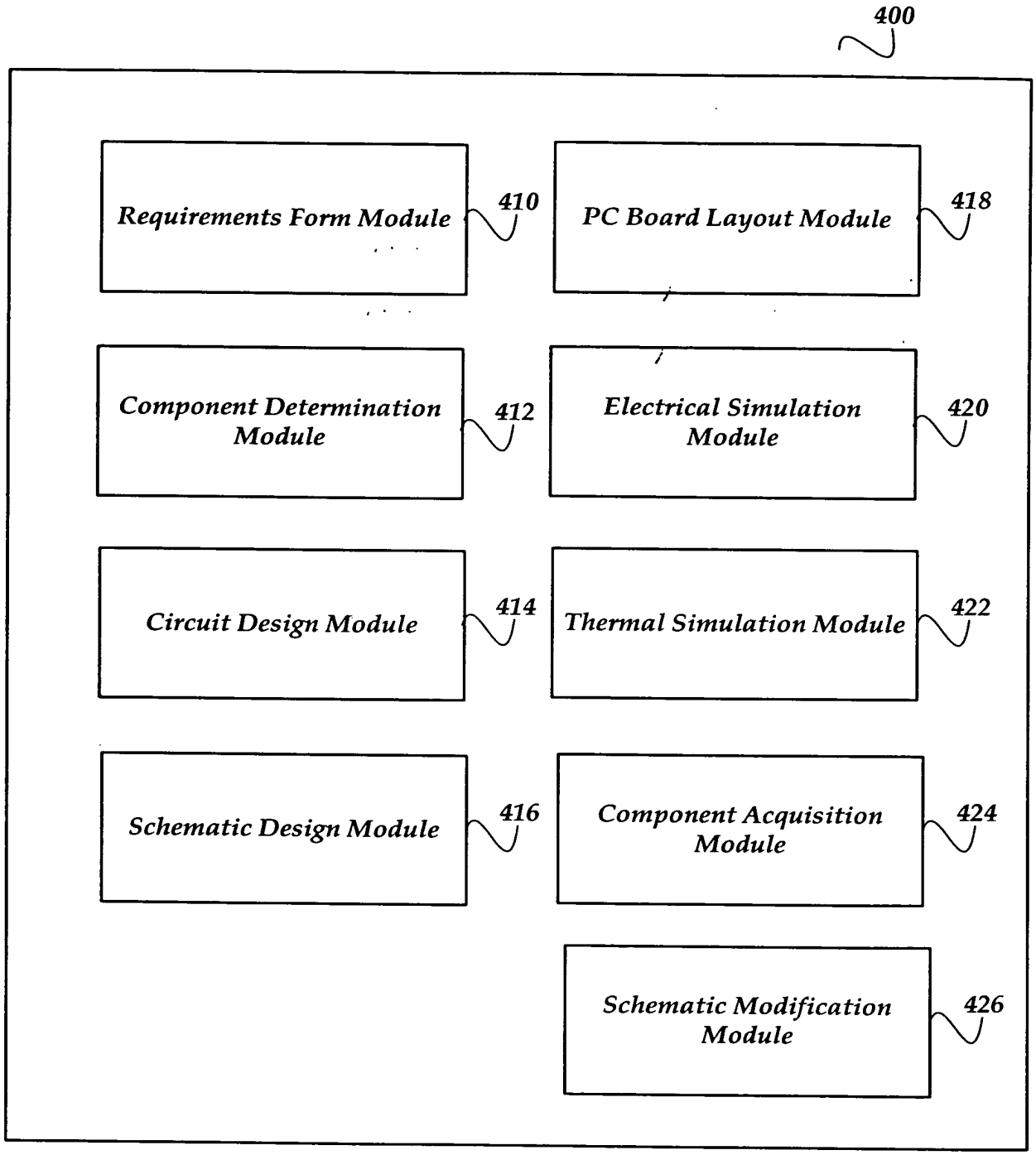

400
Requirements Form Module
410
PC Board Layout Module
418
Component Determination Module
412
Electrical Simulation Module
420
Circuit Design Module
414
Thermal Simulation Module
422
Schematic Design Module
416
Component Acquisition Module
424
Schematic Modification Module
426

*Fig.4*

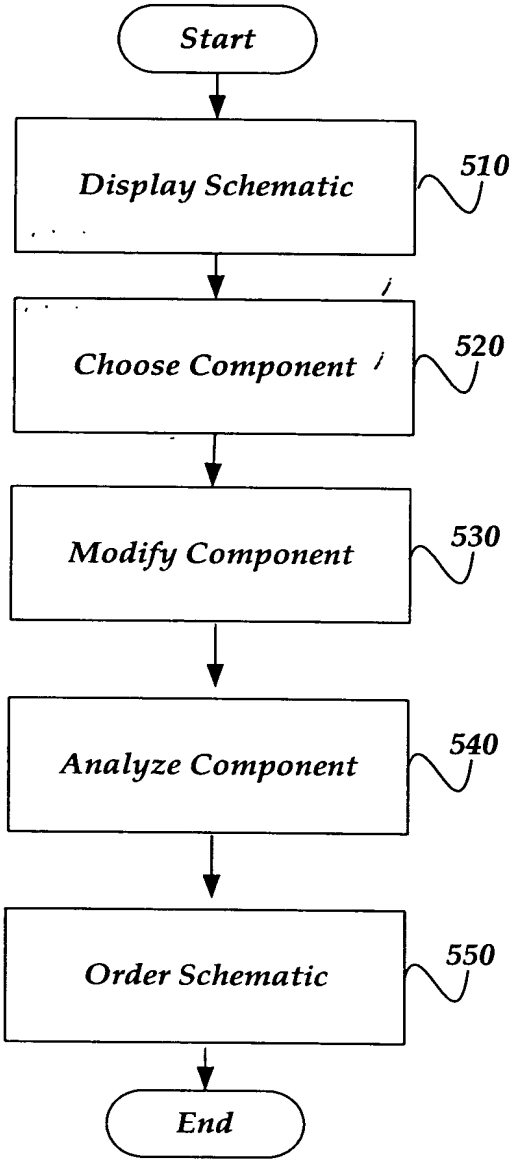
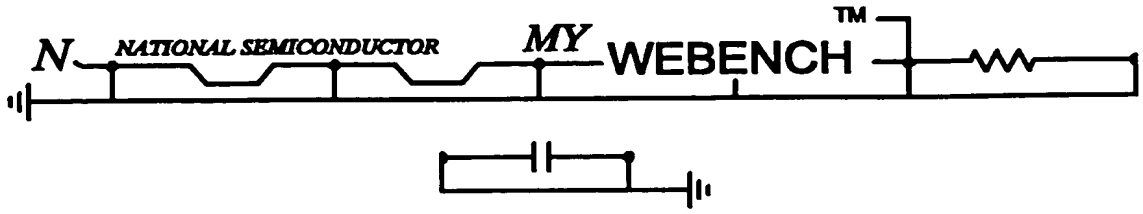

Start
Display Schematic
510
Choose Component
520
Modify Component
530
Analyze Component
540
Order Schematic
550
End

*Fig.5*




## Welcome to your power Webench™!

"Tools for the power design engineer"

START HERE — 605
to design a power supply.

## How to use Webench

Just four easy steps to design a power supply! Just click on the items below for help on that step.

610

620 — 1 Choose a Part — choose a specific part or input your system specifications to find those devices that fit.

630 — 2 Create a Design — a design will be created for you including any necessary passive components and important calculated operating values.

640 — 3 Analyze a Design — use WebSim™, the online power simulator, to validate your design electrically, and WebTHERM™, the online thermal simulator to visualize the thermal behavior of your design.

650 — 4 Build It! — buy a part, a kit of parts, or an evaluation board.

See Our Disclaimer

## Features

WebSIM™, is a browser-based simulator which allows you to probe points in the

## My Designs

Your Last 4 Designs:

- Design #6
- Design #5
- Design #4
- Design #3

660

670

MY Designs Shows all of your Designs

My WebSIM™ Simulations — 680

My WebTHERM™ Simulations — 690

My BuildIt Order — 695

## Other Power Webench Tools

Switchers Made Simple™ is downloadable software that enables you to develop a complete power supply design on your local PC. This covers Simple Switcher devices and includes discrete component and manufacturer selection.

- SMS 6.1 (for LM267x and LM259x buck regulators, and LM258x and LM2577 boost & flyback regulators) updated!
- SMS 3.3 (for LM257X)

## Wireless Webench Tools

- Wireless Easy PLL Design Assistant

Figure 6

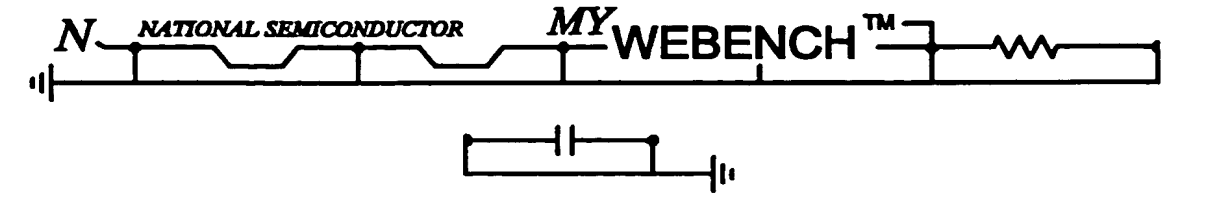
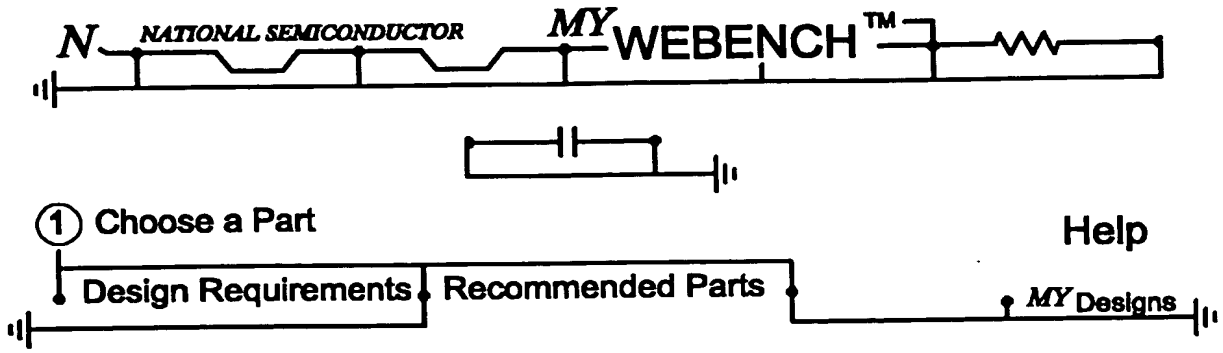





Figure 7




## Your Design Specifications

| | |
|---|---|
| VinMin : 20.0 V<br>VinMax : 22.0 V | Output #1<br>Vout = 5.00 V<br>Iout = 5.00 A |

## Suggested Switching Regulators - Buck Topology

| Product Folder | Webench Tools | Max Curr. | Typ. Eff. | On/ Off | Err. Pin | Other Features | Freq. kHz | Est. Price |
|---|---|---|---|---|---|---|---|---|
| LM2678-5.0 | Create Design<br>WebTHERM™ Enabled Build It - Custom Kit (806, 808) | 5.0A | 84% | Y | Y | | 260 | $3.84 |
| LM2678-ADJ | Create Design<br>WebTHERM™ Enabled Build It - Custom Kit (800) | 5.0A | 84% | Y | Y | Adj. Vout | 260 | $3.84 |
| LM2679-5.0 | Create Design<br>WebTHERM™ Enabled Build It - Custom Kit (806) | 5.0A | 84% | Y | Y | SoftStart, Adj. Peak Current limit | 260 | $4.07 |
| 804 LM2679-ADJ | Create Design<br>WebTHERM™ Enabled Build It - Custom Kit (806) | 5.0A | 84% | Y | Y | SoftStart, Adj. Peak Current Limit, Adj. Vout | 260 | $4.07 |

802

Figure 8A

## Suggested Switching Regulators - Flyback Topology

| Product Folder | Webench Tools | Max Curr. | Typ. Eff. | On/ Off | Err. Pin | Other Features | Freq. kHz | Est. Price |
|---|---|---|---|---|---|---|---|---|
| LM2585-5.0 | Create Design | 3.0A | 93% | N | N | SoftStart | 100 | $3.42 |
| LM2585-ADJ | Create Design | 3.0A | 80% | N | N | SoftStart, Adj. Vout | 100 | $3.42 |
| LM2586-5.0 | Create Design | 3.0A | 80% | Y | N | Sync, SoftStart | 100 | $3.45 |
| LM2586-ADJ | Create Design | 3.0A | 80% | Y | N | Sync, SoftStart, Adj. Vout | 100 | $3.45 |
| LM2587-5.0 | Create Design | 5.0A | 80% | N | N | SoftStart | 100 | $4.51 |
| LM2587-ADJ | Create Design | 5.0A | 80% | N | N | SoftStart, Adj. Vout | 100 | $4.51 |
| LM2588-5.0 | Create Design | 5.0A | 80% | Y | N | Sync, SoftStart | 100 | $4.61 |
| LM2588-ADJ | Create Design | 5.0A | 80% | Y | N | Sync, SoftStart, Adj. Vout | 100 | $4.61 |
| LM2577-ADJ | Create Design | 3.0A | 80% | N | N | SoftStart, Adj. Vout | 52 | $3.15 |

Figure 8B


Products > Analog - Regulators > Simple Switchers > LM2679

# Product Folder

905 Live Simulation

Buy LM2679-5.0 Evaluation Board

## LM2679 SIMPLE SWITCHER 5A Step-Down Voltage Regulator with Adjustable Current Limit

Generic P/N 2679

## Contents

902
- General Description
- Features
- Applications
- Datasheet
- Package Availability, Models, Samples & Pricing
- Design Tools

| Parametric Table | |
|---|---|
| Multiple Output Capability | No |
| On/Off Pin | Yes |
| Error Flag | Yes |
| Input Voltage, min (Volt) | 8, 15 |
| Input Voltage, max (Volt) | 40 |
| Output Current, max | 5 Amps |
| Output Voltage (Volt) | 5, 12, 3.30 |
| Adjustable Output Voltage | No, Yes |
| Switching Frequency (Hz) | 260000 |
| Adjustable Switching Frequency | No |
| Sync Pin | No |
| Efficiency (%) | 84, 92, 82 |
| Flyback | No |
| Step-up | No |
| Step-down | Yes |

904

Figure 9

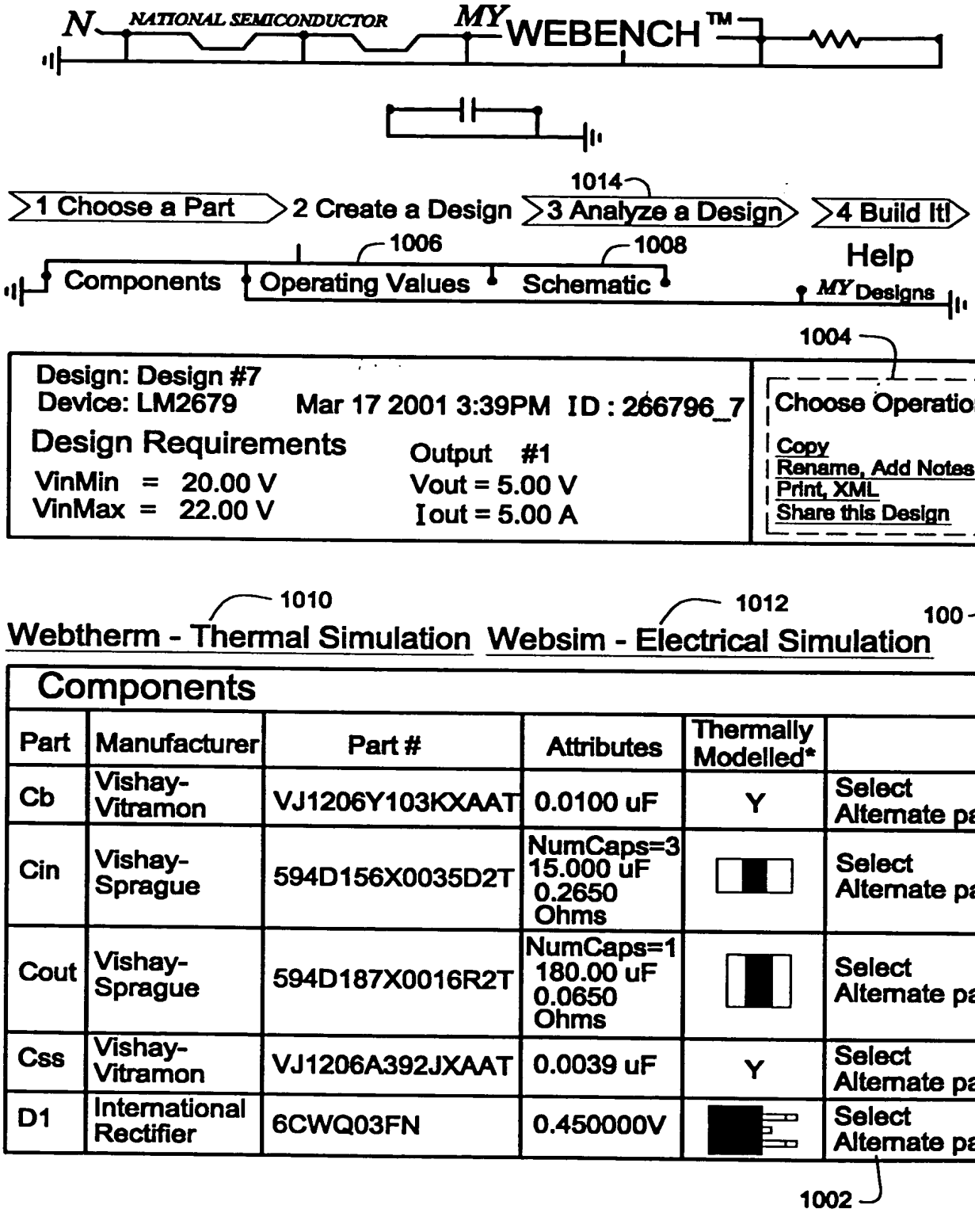
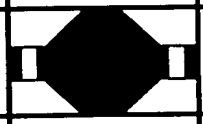
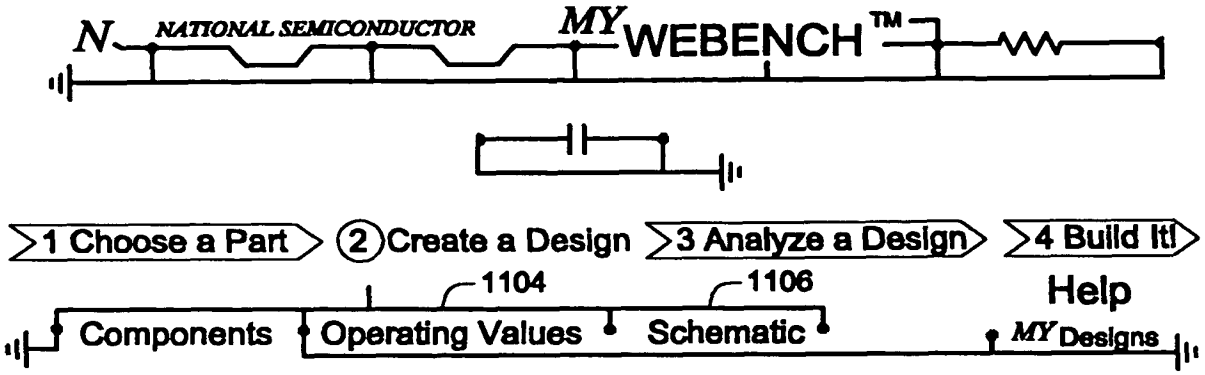

NATIONAL SEMICONDUCTOR
MY WEBENCH™
1014
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
1006
1008
Components
Operating Values
Schematic
Help
MY Designs
1004
Design: Design #7
Device: LM2679
Mar 17 2001 3:39PM ID : 266796_7
Design Requirements
VinMin = 20.00 V
VinMax = 22.00 V
Output #1
Vout = 5.00 V
Iout = 5.00 A
Choose Operation
Copy
Rename, Add Notes
Print, XML
Share this Design
1010
Webtherm - Thermal Simulation
1012
Websim - Electrical Simulation
100
Components
Part
Manufacturer
Part #
Attributes
Thermally Modelled*
Cb
Vishay-Vitramon
VJ1206Y103KXAAT
0.0100 uF
Y
Select Alternate part
Cin
Vishay-Sprague
594D156X0035D2T
NumCaps=3
15.000 uF
0.2650 Ohms
Select Alternate part
Cout
Vishay-Sprague
594D187X0016R2T
NumCaps=1
180.00 uF
0.0650 Ohms
Select Alternate part
Css
Vishay-Vitramon
VJ1206A392JXAAT
0.0039 uF
Y
Select Alternate part
D1
International Rectifier
6CWQ03FN
0.450000V
Select Alternate part
1002

Figure 10A

| | | | | | |
|---|---|---|---|---|---|
| IC | National Semi-conductor | LM2679S-ADJ | ADJV,Buck |  | Select Alternate part |
| L1 | Coiltronics | UP4B-150 | 15.000 uH, 0.0200 Ohms |  | Select Alternate part |
| Rfb1 | Vishay-Dale | CRCW1206-1001FRT1 | 1000 Ohms | Y | Select Alternate part |
| Rfb2 | Vishay-Dale | CRCW1206-3161FRT1 | 3160 Ohms | Y | Select Alternate part |
| Rilim | Vishay-Dale | CRCW1206-4991FRT1 | 4990 Ohms | Y | Select Alternate part |

* Components marked "Y" are not required for Thermal Simulation.


Figure 10B




Design: Design #7
Device: LM2679 Mar 17 2001 3:39PM ID: 266796_7

| Design Requirements | Output #1 |
|---|---|
| VinMin = 20.00 V | Vout = 5.00 V |
| VinMax = 22.00 V | Iout = 5.00 A |

## Select Alternate for Component D1

Please select from the list of available alternates below. Click on the " Update BOM " buttom when you are done. Update - BOM 1102

1108

| Alternates | Part # Manufacturer | Thermally Modelled | Forward Voltage Drop | Max Rated Current | Max Voltage Rating | x,y,z in mm | Price | Quantity Available |
|---|---|---|---|---|---|---|---|---|
| Custom ○ | | N | Limit = 0.00 V | 1110 Limit >= 5.00 | 1112 Limit >= 26.4 | | | |
| 1 ○ | 6CWQ03FN International Rectifier | | 0.45000V | 7.000A | 30.00V | 10.42 6.73 2.38 | $0.85 | >10 in stock |
| 2 ○ | 50WQ03FN International Rectifier | | 0.46000V | 5.500A | 30.00V | 10.42 6.73 2.38 | $1.83 | >10 in stock |
| 3 ○ | 12CWQ03-FNTRL International Rectifier | | 0.47000V | 12.00A | 30.00V | 10.42 6.73 2.38 | $0.82 | >10 in stock |
| 4 ○ | 50WQ04FN International Rectifier | | 0.51000V | 5.500A | 40.00V | 10.42 6.73 2.38 | $1.33 | >10 in stock |

Figure 11A

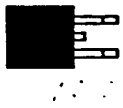
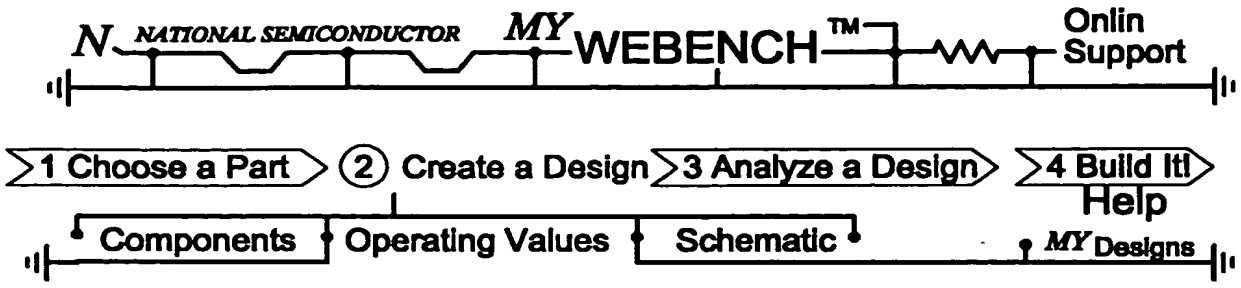
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5 ⊙ | 12CWQ04FN International Rectifier |  | 0.52000V | 12.00A | 40.00V | 10.42 6.73 2.38 | $1.48 | >10 in stock |
| 6 ○ | 6CWQ04FN International Rectifier |  | 0.53000V | 7.000A | 40.00V | 10.42 6.73 2.38 | $1.00 | >10 in stock |
| 7 ○ | 50WQ06FN International Rectifier |  | 0.57000V | 5.500A | 60.00V | 10.42 6.73 2.38 | $1.07 | >10 in stock |
| 8 ○ | 12CWQ06FN International Rectifier |  | 0.61000V | 12.00A | 60.00V | 10.42 6.73 2.38 | $0.72 | >10 in stock |
| 9 ○ | 6CWQ06-FNTR International Rectifier |  | 0.61000V | 7.000A | 60.00V | 10.42 6.73 2.38 | $1.08 | >10 in stock |

Figure 11B




| Design: Design #7<br>Device: LM2679 | Mar 17 2001<br>3:39:00:000PM | ID:<br>266796_7 | Choose Operation |
|---|---|---|---|
| Design Requirements<br>VinMin = 20.00 V<br>VinMax = 22.00 V | Output #1<br>Vout = 5.00 V<br>Iout = 5.00 A | | Copy<br>Rename, Add Notes<br>Print, XML<br>Share this Design |

Vin: 22.00 V  Iout 5.00 A  SUBMIT

**Operating Values**

| # | Description | Parameter | Value |
|---|---|---|---|
| 1 | Pulse Width Modulation (PWM) Frequency | Frequency | 260 kHz |
| 2 | Continuous or Discontinuous Conduction Mode, inductor current goes to zero in Discontinuous Conduction | Mode | Cont |
| 3 | Total Output Power | Pout | 25.0W |
| 4 | Vin operating point | Vin Op | 22.00V |
| 5 | Iout operating point | Iout Op | 5.00A |

**Operating Point at Vin = 22.00 V, 5.00 A**

| # | Description | Parameter | Value |
|---|---|---|---|
| 1 | Bode Plot Crossover Frequency, indication of bandwidth of supply | Cross Freq | 97.7 kHz |
| 2 | Steady State PWM Duty Cycle, range limits from 0 to 100 | Duty Cycle | 25.8% |
| 3 | Steady State Efficiency | Efficiency | 85.3% |
| 4 | IC Junction Temperature | IC Tj | 120 °C |
| 5 | IC Junction to Ambient Thermal Resistance | ICThetaJA | 34.9 °C/W |
| 6 | Bode Plot Phase Margin | Phase Marg | 71.0 Deg |
| 7 | Peak-to-peak ripple voltage | Vout p-p | 0.07 V |

Figure 12A

| Current Analysis | | | |
|---|---|---|---|
| # | Description | Parameter | Value |
| 1 | Input Capacitor RMS ripple current | Cin IRMS | 2.2 A |
| 2 | Output Capacitor RMS ripple current | Cout IRMS | 0.20 A |
| 3 | Peak Current in IC for Steady State Operating Point | IC Ipk | 5.5 A |
| 4 | ICs Maximum rated peak current | IC Ipk Max | 7.4 A |
| 5 | Average input current | Iin Avg | 2.3 A |
| 6 | Inductor ripple current, peak-to-peak Value | L Ipp | 1.1 A |

| Power Dissipation Analysis | | | |
|---|---|---|---|
| # | Description | Parameter | Value |
| 1 | Input Capacitor Power Dissipation | Cin Pd | 0.43 W |
| 2 | Output Capacitor Power Dissipation | Cout Pd | 0.0026 W |
| 3 | Diode Power Dissipation | Diode Pd | 1.9 W |
| 4 | IC Power Dissipation | IC Pd | 1.4 W |
| 5 | Inductor Power Dissipation | L Pd | 0.50 W |




Figure 12B

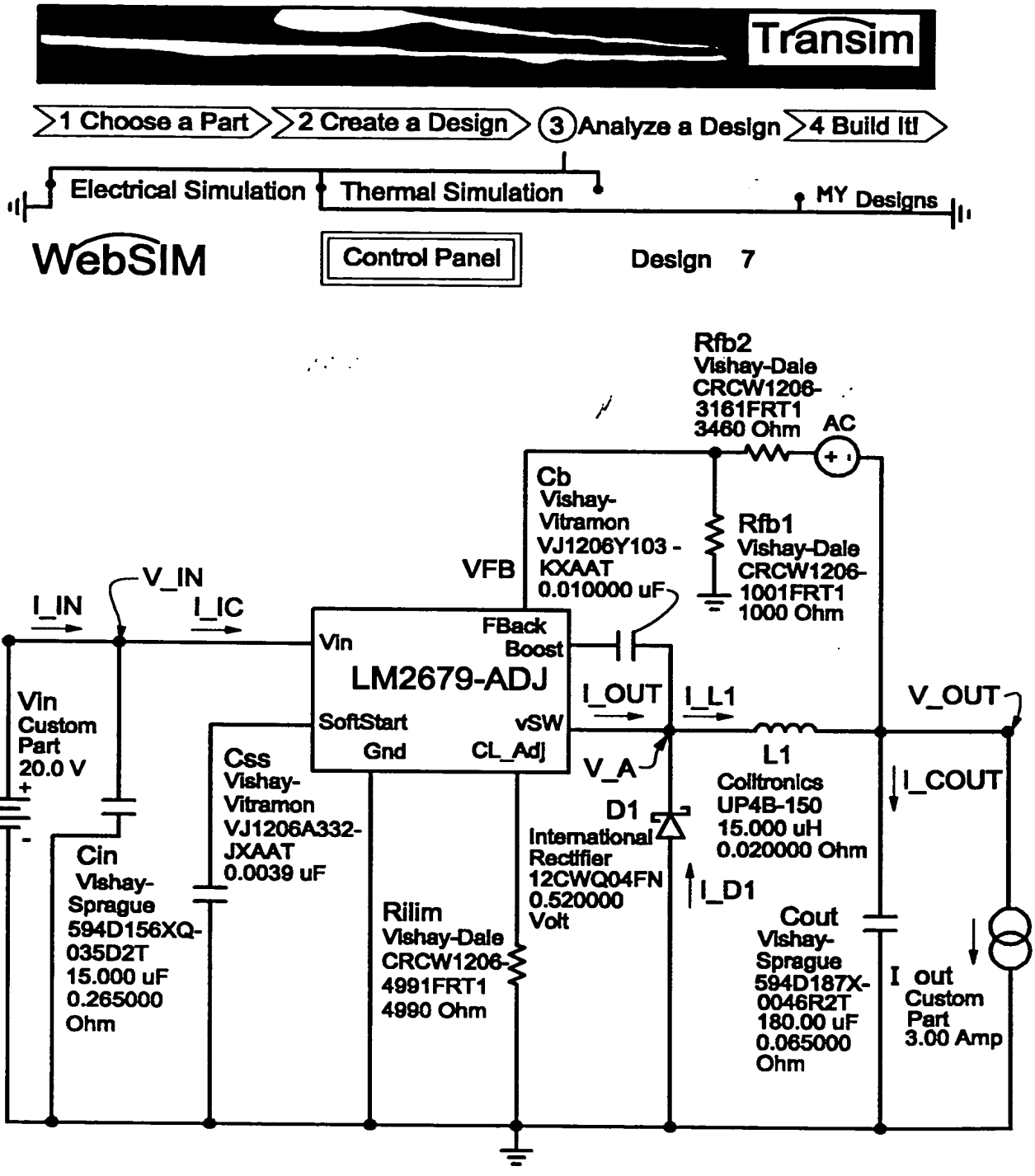

Transim
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Electrical Simulation
Thermal Simulation
MY Designs
WebSIM
Control Panel
Design 7
Rfb2
Vishay-Dale
CRCW1206-
3161FRT1
3460 Ohm
AC
Cb
Vishay-
Vitramon
VJ1206Y103 -
KXAAT
0.010000 uF
Rfb1
Vishay-Dale
CRCW1206-
1001FRT1
1000 Ohm
VFB
V_IN
I_IN
I_IC
Vin
FBack
Boost
LM2679-ADJ
SoftStart
vSW
Gnd
CL_Adj
I_OUT
I_L1
V_OUT
Vin
Custom
Part
20.0 V
Css
Vishay-
Vitramon
VJ1206A332-
JXAAT
0.0039 uF
V_A
L1
Coiltronics
UP4B-150
15.000 uH
0.020000 Ohm
I_COUT
D1
International
Rectifier
12CWQ04FN
0.520000
Volt
I_D1
Cin
Vishay-
Sprague
594D156XQ-
035D2T
15.000 uF
0.265000
Ohm
Rilim
Vishay-Dale
CRCW1206-
4991FRT1
4990 Ohm
Cout
Vishay-
Sprague
594D187X-
0046R2T
180.00 uF
0.065000
Ohm
I out
Custom
Part
3.00 Amp

Figure 13

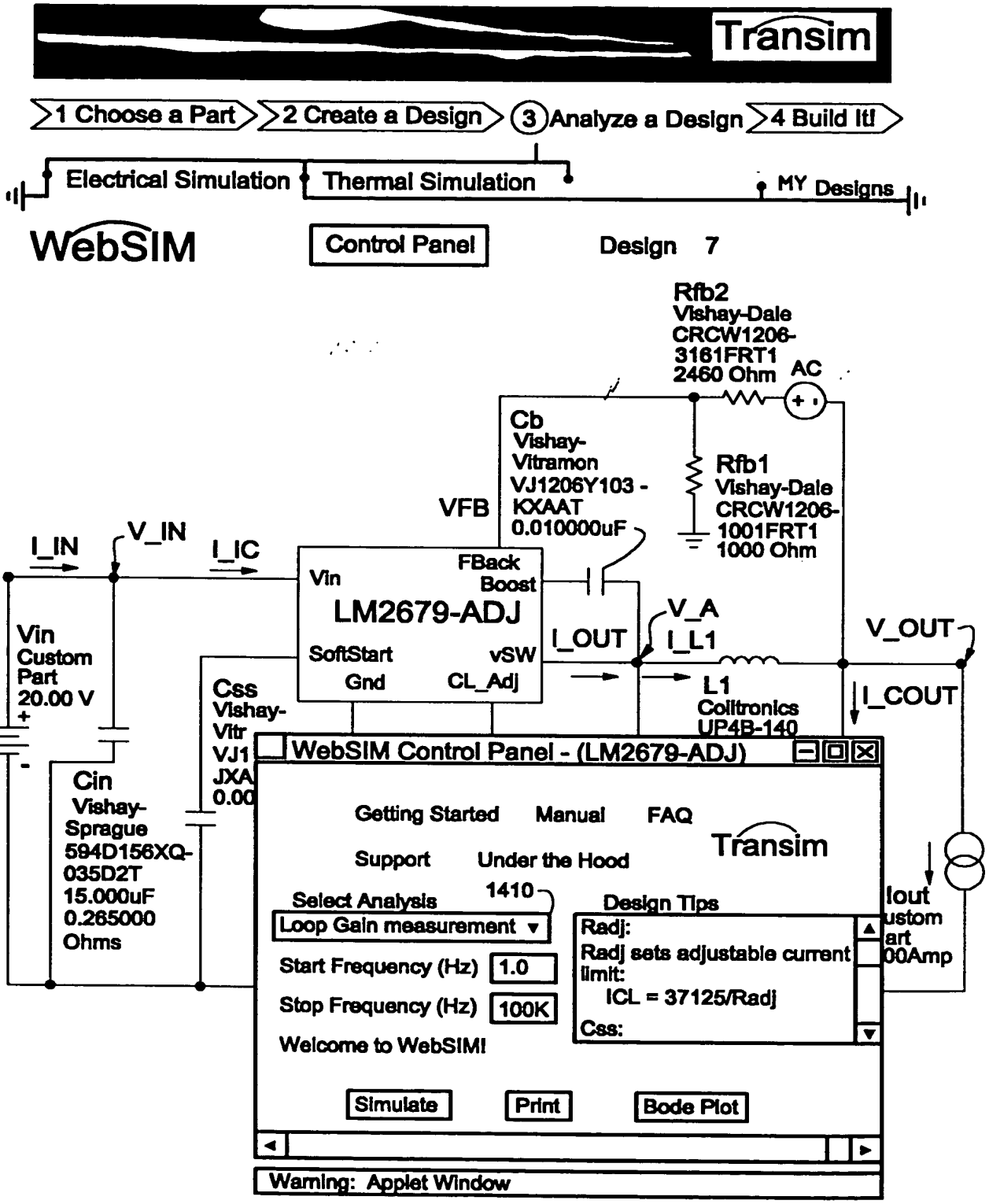
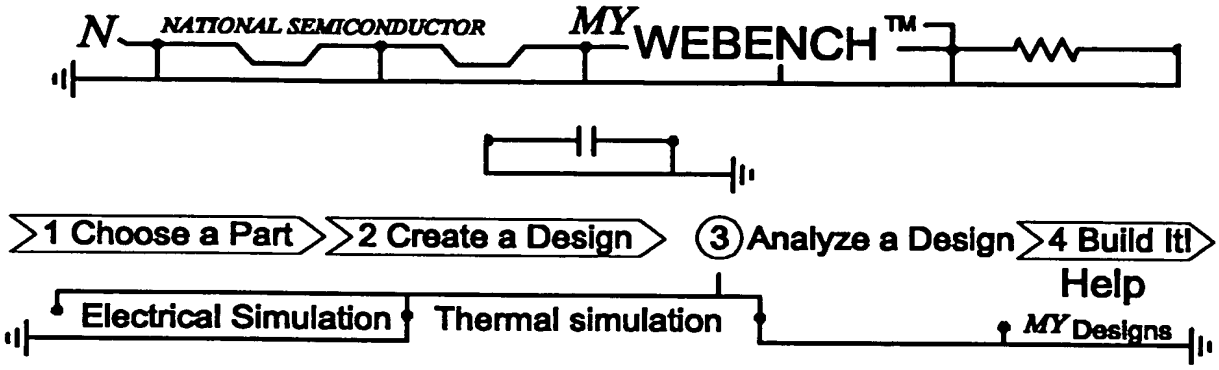

Transim
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Electrical Simulation
Thermal Simulation
MY Designs
WebSIM
Control Panel
Design 7
Rfb2
Vishay-Dale
CRCW1206-
3161FRT1
2460 Ohm
AC
Cb
Vishay-
Vitramon
VJ1206Y103 -
KXAAT
0.010000uF
Rfb1
Vishay-Dale
CRCW1206-
1001FRT1
1000 Ohm
VFB
I_IN
V_IN
I_IC
Vin
FBack
Boost
LM2679-ADJ
SoftStart
vSW
Gnd
CL_Adj
I_OUT
V_A
I_L1
V_OUT
I_COUT
Vin
Custom
Part
20.00 V
+
-
Cin
Vishay-
Sprague
594D156XQ-
035D2T
15.000uF
0.265000
Ohms
Css
Vishay-
Vitr
VJ1
JXA
0.00
L1
Coiltronics
UP4B-140
WebSIM Control Panel - (LM2679-ADJ)
Getting Started
Manual
FAQ
Transim
Support
Under the Hood
1410
Select Analysis
Loop Gain measurement
Design Tips
Radj:
Radj sets adjustable current limit:
ICL = 37125/Radj
Css:
Start Frequency (Hz)
1.0
Stop Frequency (Hz)
100K
Welcome to WebSIM!
Simulate
Print
Bode Plot
Warning: Applet Window
Iout
ustom
art
00Amp

Figure 14


NATIONAL SEMICONDUCTOR
MY WEBENCH™
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Help
Electrical Simulation
Thermal simulation
MY Designs
Start a new WebTHERM simulation
1530
This will take about 20 seconds to create the board layout to prepare for WebTHERM.
Check the status of previous simulations for this design below.
WebTHERM™ Simulations:
Simulation
1510
ID
Name
Status
Date
Comments
(click to view)
No WebTHERM™ simulation info.
Click here to see a list of all your WebTHERM Simulations.
1520
Please click Refresh to get updated status of your simulations.
We will also send you email notification when your simulations are complete.
It will contain a URL which can be clicked for viewing your simulations.
Queued time is dependent on the number of requests in the queue.
Processing time for each simulation is estimated about 2-3 minutes.
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Parametric Search
See Our Disclaimer
Product Tree
Back to Webench
About Languages. Website Guide. About "Cookies". National is QS 9000 Certified
Site Terms & Conditions of Use. Copyright 2001 © National Semiconductor Corporation
Privacy/Security Statement. MY: Preferences. Feedback

Figure 15

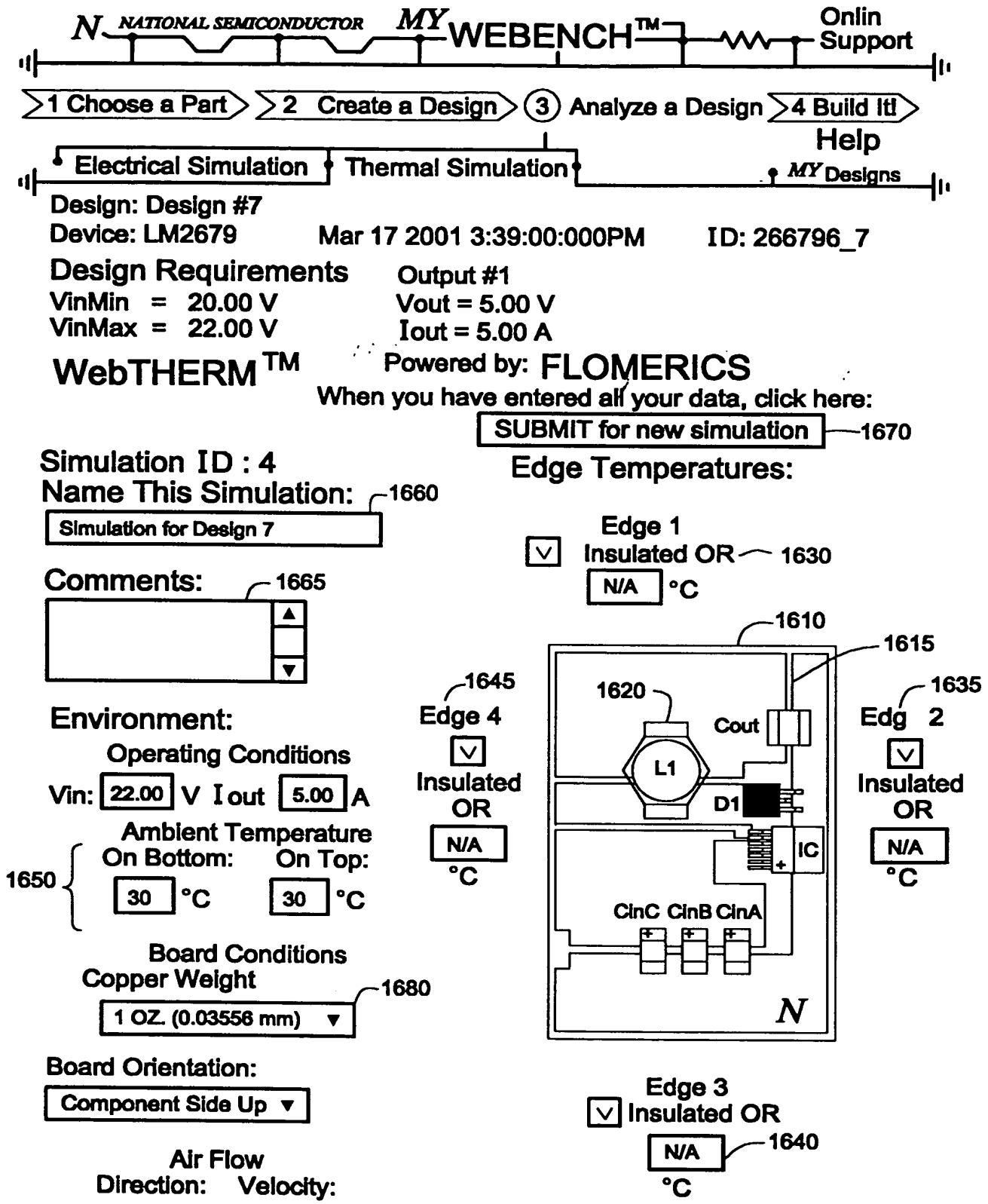
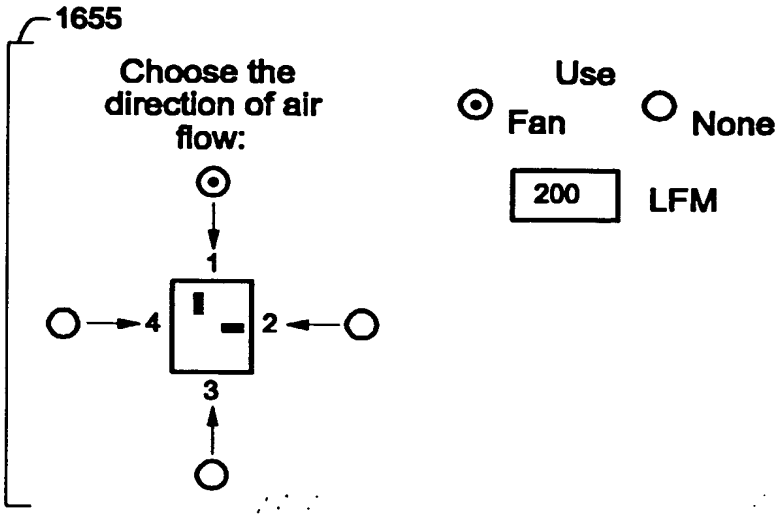

N NATIONAL SEMICONDUCTOR MY WEBENCH™
Onlin Support
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Help
Electrical Simulation
Thermal Simulation
MY Designs
Design: Design #7
Device: LM2679
Mar 17 2001 3:39:00:000PM
ID: 266796_7
Design Requirements
VinMin = 20.00 V
VinMax = 22.00 V
Output #1
Vout = 5.00 V
Iout = 5.00 A
WebTHERM™
Powered by: FLOMERICS
When you have entered all your data, click here:
SUBMIT for new simulation
1670
Simulation ID : 4
Name This Simulation:
1660
Simulation for Design 7
Comments:
1665
Environment:
Operating Conditions
Vin: 22.00 V Iout 5.00 A
Ambient Temperature
On Bottom: On Top:
30 °C 30 °C
1650
Board Conditions
Copper Weight
1 OZ. (0.03556 mm)
1680
Board Orientation:
Component Side Up
Air Flow
Direction: Velocity:
Edge Temperatures:
Edge 1
Insulated OR
1630
N/A °C
1610
1615
1620
Cout
L1
D1
IC
CinC CinB CinA
N
1645
Edge 4
Insulated OR
N/A °C
1635
Edg 2
Insulated OR
N/A °C
Edge 3
Insulated OR
N/A
1640
°C

Figure 16A



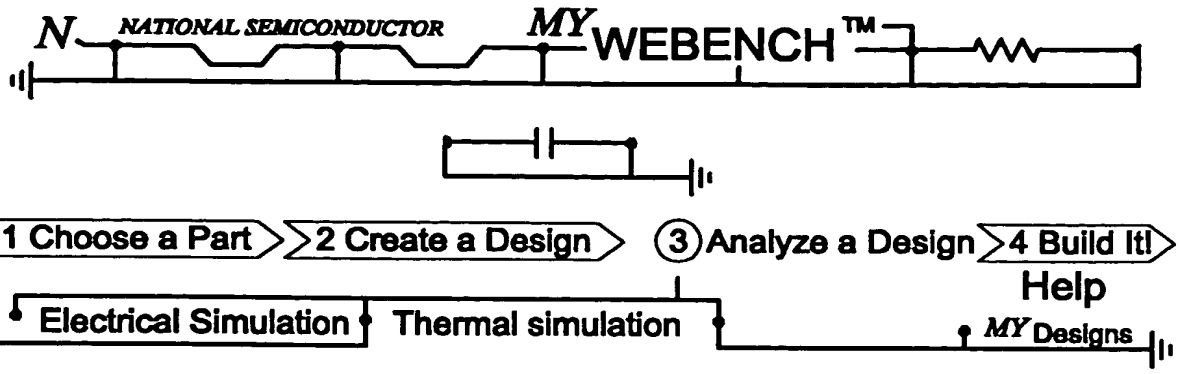

| BOM | | | |
|---|---|---|---|
| Component | Power Dissipation | Manufacturer | Part# |
| Cin | 0.43 W | Vishay-Sprague | 594D156X0035D2T |
| Cout | 0.0026 W | Vishay-Sprague | 594D187X0016R2T |
| D1 | 1.9 W | International Rectifier | 12CWQ04FN |
| IC | 1.4 W | National Semiconductor | LM2679 |
| L1 | 0.50 W | Coiltronics | UP4B-150 |

## Design Assistant Messages

All components fit!




Figure 16B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1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Help
Electrical Simulation
Thermal simulation
MY Designs
Start a new WebTHERM simulation
This will take about 20 seconds to create the board layout to prepare for WebTHERM. Check the status of previous simulations for this design below.
WebTHERM™ Simulations :
Simulation ID
Name (click to view)
Status
Date
Comments
7 = Design ID
Simulations for Design ID : 7
Design ID : 7
1
Simulation for Design 7
queued
Mar 17 2001 5 : 05 : 45 PM
1710
Please click Refresh to get updated status of your simulations.
We will also send you email notification when your simulations are complete. It will contain a URL which can be clicked for viewing your simulations.
Queued time is dependent on the number of requests in the queue.
Processing time for each simulation is estimated about 2-3 minutes.
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Figure 17

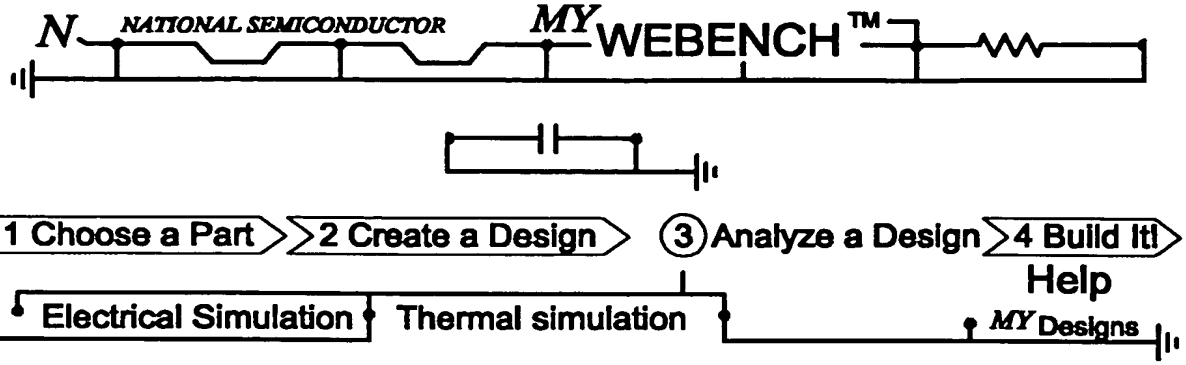
NATIONAL SEMICONDUCTOR
MY WEBENCH™
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Help
Electrical Simulation
Thermal simulation
MY Designs
Start a new WebTHERM simulation
This will take about 20 seconds to create the board layout to prepare for WebTHERM. Check the status of previous simulations for this design below.
WebTHERM™ Simulations :
Simulation ID
Name
Status
Date
Comments
(click to view)
7 = Design ID
Simulations for Design ID : 7
Design ID : 7
1
Simulation for Design 7
Processing
Mar 17 2001 5 : 05 : 57 PM
1710
Please click Refresh to get updated status of your simulations.
We will also send you email notification when your simulations are complete. It will contain a URL which can be clicked for viewing your simulations.
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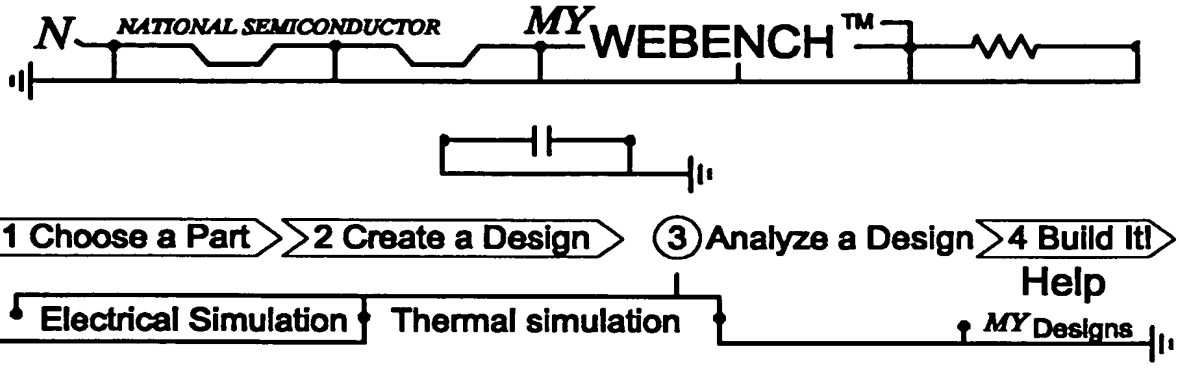
Figure 18




WebTHERM™ Simulations :

| ID | Simulation Name (click to view) | Status | Date | Comments |
|---|---|---|---|---|
| 7 = Design ID | | Simulations for Design D : 7 | | Design ID : 7 |
| 1 | Simulation for Design 7 | Completed | Mar 17 2001 5 : 10 : 22 PM | |

Please click Refresh to get updated status of your simulations.

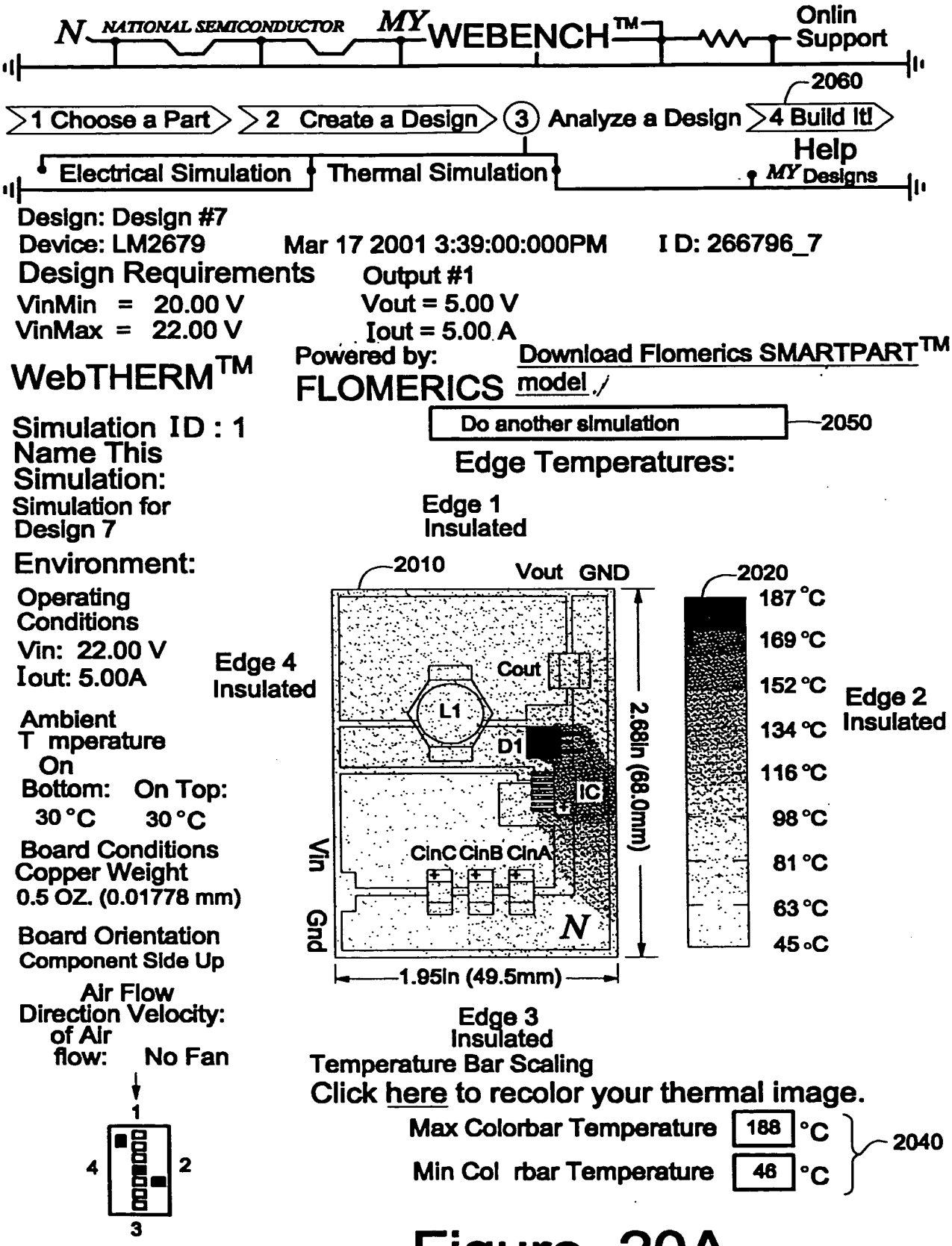
We will also send you email notification when your simulations are complete, It will contain a URL which can be clicked for viewing your simulations.

Queued time is dependent on the number of requests in the queue.

Processing time for each simulation is estimated about 2-3 minutes.




Figure 19


NATIONAL SEMICONDUCTOR MY WEBENCH™
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2060
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Help
Electrical Simulation
Thermal Simulation
MY Designs
Design: Design #7
Device: LM2679
Mar 17 2001 3:39:00:000PM
I D: 266796_7
Design Requirements
VinMin = 20.00 V
VinMax = 22.00 V
Output #1
Vout = 5.00 V
Iout = 5.00 A
WebTHERM™
Powered by:
FLOMERICS
Download Flomerics SMARTPART™ model
Do another simulation
2050
Simulation ID : 1
Name This Simulation:
Simulation for Design 7
Edge Temperatures:
Edge 1 Insulated
Environment:
Operating Conditions
Vin: 22.00 V
Iout: 5.00A
2010
Vout GND
2020
187 °C
169 °C
152 °C
134 °C
116 °C
98 °C
81 °C
63 °C
45 °C
Edge 4 Insulated
Cout
L1
D1
IC
CinC CinB CinA
Vin
Gnd
2.68in (68.0mm)
Edge 2 Insulated
1.95in (49.5mm)
Ambient T mperature
On Bottom: 30 °C
On Top: 30 °C
Board Conditions
Copper Weight
0.5 OZ. (0.01778 mm)
Board Orientation
Component Side Up
Air Flow Direction Velocity: of Air flow: No Fan
Edge 3 Insulated
Temperature Bar Scaling
Click here to recolor your thermal image.
Max Colorbar Temperature 188 °C
Min Col rbar Temperature 46 °C
2040
1
2
3
4

Figure 20A

2030

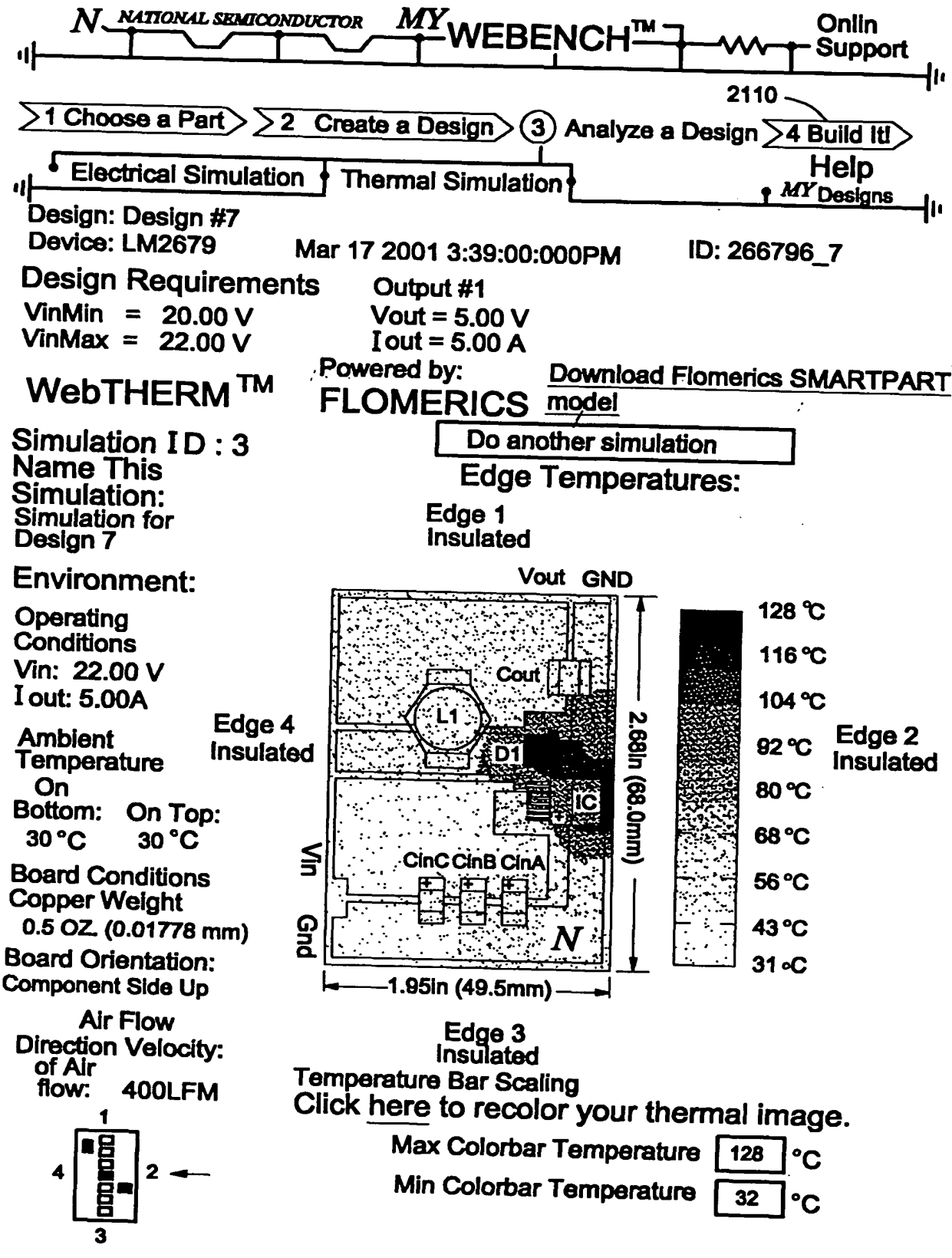
| Op rating Temperatures | | | | |
|---|---|---|---|---|
| Layer | Max Temp. | Manufacturer | Part # | Warnings |
| Cin | 82 °C | Vishay-Sprague | 594D156X0035D2T | |
| Cout | 92 °C | Vishay-Sprague | 594D187X0016R2T | |
| D1 - Diode | 188 °C | International Rectifier | 12CWQ04FN | |
| IC - Die | 174 °C | National Semiconductor | LM2679 | There is some potential problem with this design |
| IC - Top | 165 °C | | | |
| L1 - Inductor | 82 °C | Coiltronics | UP4B-150 | |
| PCB | 182 °C | | | |

## Design Assistant Messages

All components fit!




Figure 20B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2110
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Electrical Simulation
Thermal Simulation
Help
MY Designs
Design: Design #7
Device: LM2679
Mar 17 2001 3:39:00:000PM
ID: 266796_7
Design Requirements
VinMin = 20.00 V
VinMax = 22.00 V
Output #1
Vout = 5.00 V
Iout = 5.00 A
WebTHERM™
Powered by:
FLOMERICS
Download Flomerics SMARTPART™ model
Do another simulation
Simulation ID : 3
Name This Simulation:
Simulation for Design 7
Edge Temperatures:
Edge 1 Insulated
Environment:
Operating Conditions
Vin: 22.00 V
Iout: 5.00A
Ambient Temperature
On Bottom: 30 °C
On Top: 30 °C
Edge 4 Insulated
Vout GND
Cout
L1
D1
IC
CinC CinB CinA
Vin
Gnd
2.68in (68.0mm)
1.95in (49.5mm)
128 °C
116 °C
104 °C
92 °C
80 °C
68 °C
56 °C
43 °C
31 °C
Edge 2 Insulated
Board Conditions
Copper Weight
0.5 OZ. (0.01778 mm)
Board Orientation:
Component Side Up
Air Flow Direction Velocity: of Air flow: 400LFM
1
2
3
4
Edge 3 Insulated
Temperature Bar Scaling
Click here to recolor your thermal image.
Max Colorbar Temperature 128 °C
Min Colorbar Temperature 32 °C

Figure 21A

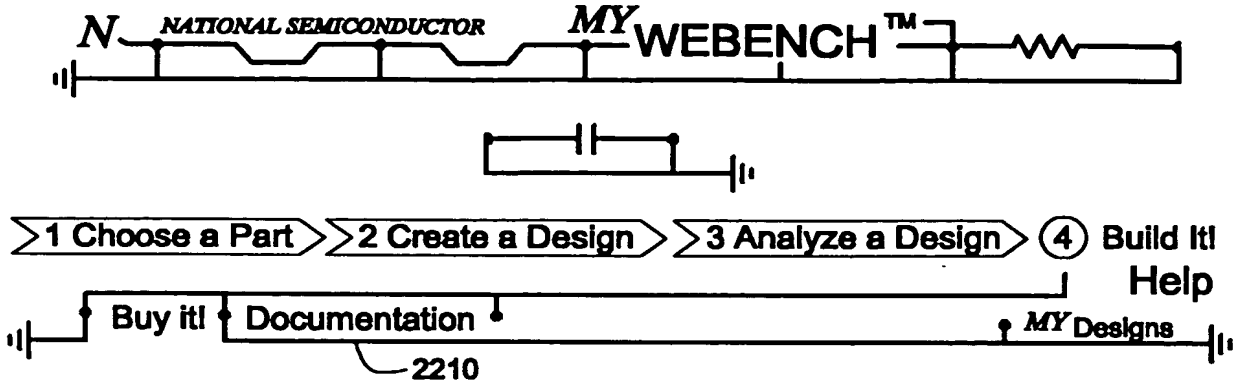
| Operating Temperatures | | | | |
|---|---|---|---|---|
| Layer | Max Temp. | Manufacturer | Part # | Warnings |
| Cin | 50 °C | Vishay-Sprague | 594D156X0035D2T | |
| Cout | 50 °C | Vishay-Sprague | 594D187X0016R2T | |
| D1 - Diode | 128 °C | International Rectifier | 12CWQ04FN | |
| IC - Die | 112 °C | National Semiconductor | LM2679 | There is some potential problem with this design. |
| IC - Top | 97 °C | | | |
| L1 - Inductor | 46 °C | Coiltronics | UP4B-150 | |
| PCB | 123 °C | | | |

## Design Assistant Messages

All components fit




Figure 21B




## Design : 7

**Your design is supported by a Webench Custom Evaluation Kit. Ordering this kit from Pioneer-Standard provides you with everything you need to realize a prototype of your design quickly and at a very low price.**

**If for some reason you decide not to order the Custom Evaluation Kit you can always order only the IC from us here.**

## Custom Evaluation Kit

Bill of Materials

2220 2230

View Assembly Doc | Order this Kit from Pioneer-Standard >>

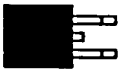
| Item | Manufacturer Part | Qty | Attributes | Component Name(s) | Pioneer Price | Pioneer Availability |
|---|---|---|---|---|---|---|
| 1 | International Rectifier 12CWQ04FN  | 1 | VFatio = 0.52 V | D1 | $1.48 | > 10 in Stock |
| 2 | Keystone 5015 | 4 | | TP1, TP2, TP3, TP6 | $0.20 | > 10 in Stock |
| 3 | National Semiconductor 551011367-011 | 1 | Surface Mount, etc | PC Board | $5.00 | > 10 in Stock |
| 4 | Vishay-Sprague 594D156X0035D2T  | 3 | Cap=15uF ESR= 0.265 Ohms | Cin | $1.00 | > 10 in Stock |
| 5 | Vishay-Sprague 594D187X0016R2T  | 1 | Cap=180uF ESR= 0.065 Ohms | Cout | $1.00 | > 10 in Stock |

Figure 22A

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | Vishay-Dal CRCW1206-1001FRT1 | 1 | Resistance =1000 Ohms | Rfb1 | $0.03 | > 10 in Stock |
| 7 | Vishay-Dale CRCW1206-3161FRT1 | 1 | Resistance =3160 Ohms | Rfb2 | $0.03 | > 10 in Stock |
| 8 | Vishay-Dale CRCW1206-4991FRT1 | 1 | Resistance =4990 Ohms | Rilim | $0.03 | > 10 in Stock |
| 9 | National Semiconductor LM2679S-ADJ | 1 | Package=S, Voltage option=ADJ, Topology= Buck | IC | $4.75 | > 10 in Stock |
| 10 | Coiltronics UP4B-150  | 1 | L = 15uH DCR = 0.02 Ohms | L1 | $1.50 | > 10 in Stock |
| 11 | Vishay-Vitramon VJ1206A392JXAAT | 1 | Cap = 0.0039uF | Css | $0.05 | > 10 in Stock |
| 12 | Vishay-Vitramon VJ1206Y103KXAAT | 1 | Cap = 0.01uF | Cb | $0.05 | > 10 in Stock |
| 13 | Vishay-Vitramon VJ1206Y104KXAAT | 1 | | Cinx | $0.05 | > 10 in Stock |
| | | | | Total | $17.77 | |

Bill of Materials | View Assembly Doc | Order this Kit from Pioneer-Standard >>

## Order the IC

- Order the LM2679S-ADJ in volume
- Order a Free Sample

## Generic Eval Board for LM2679

- Buy Eval Board for LM2679
- Download Protel File (See Notes Below)

The Protel files are saved as Self Extracting Zip Archives. To download a product's Protel fil , click on the corresponding "Protel file now" link, and save the link as a file on your computer. Then run the file on your computer (double click). This will automatically decompress the Protel file to your computer's disk.
Note: You must have Protel software or other software that can read Protel PCB layout files in order to take advantage of these Protel files.

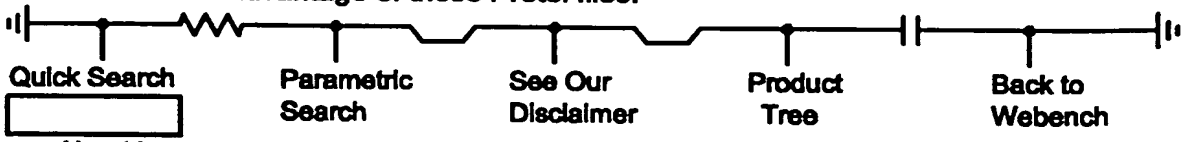
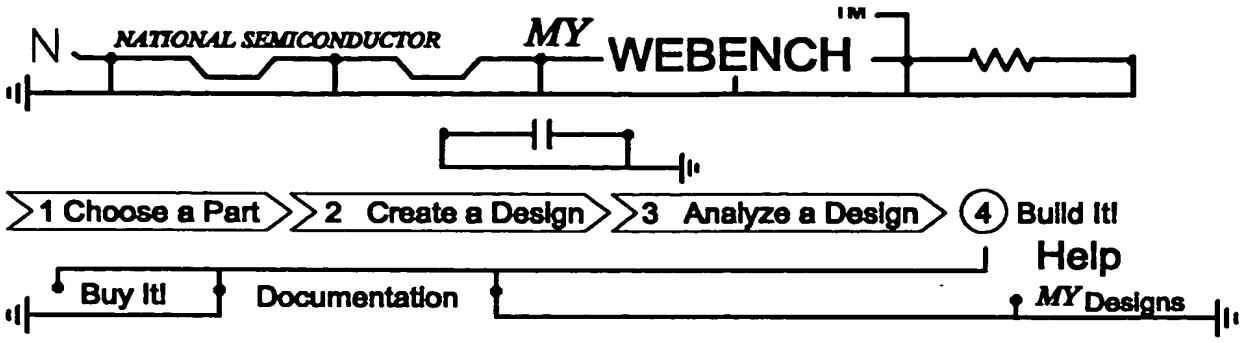





Figure 22B




## Assembly Document for Your LM2679 Disign # : 7

### LM2679 SMD Evaluation Board (LM2679BU1PWB)

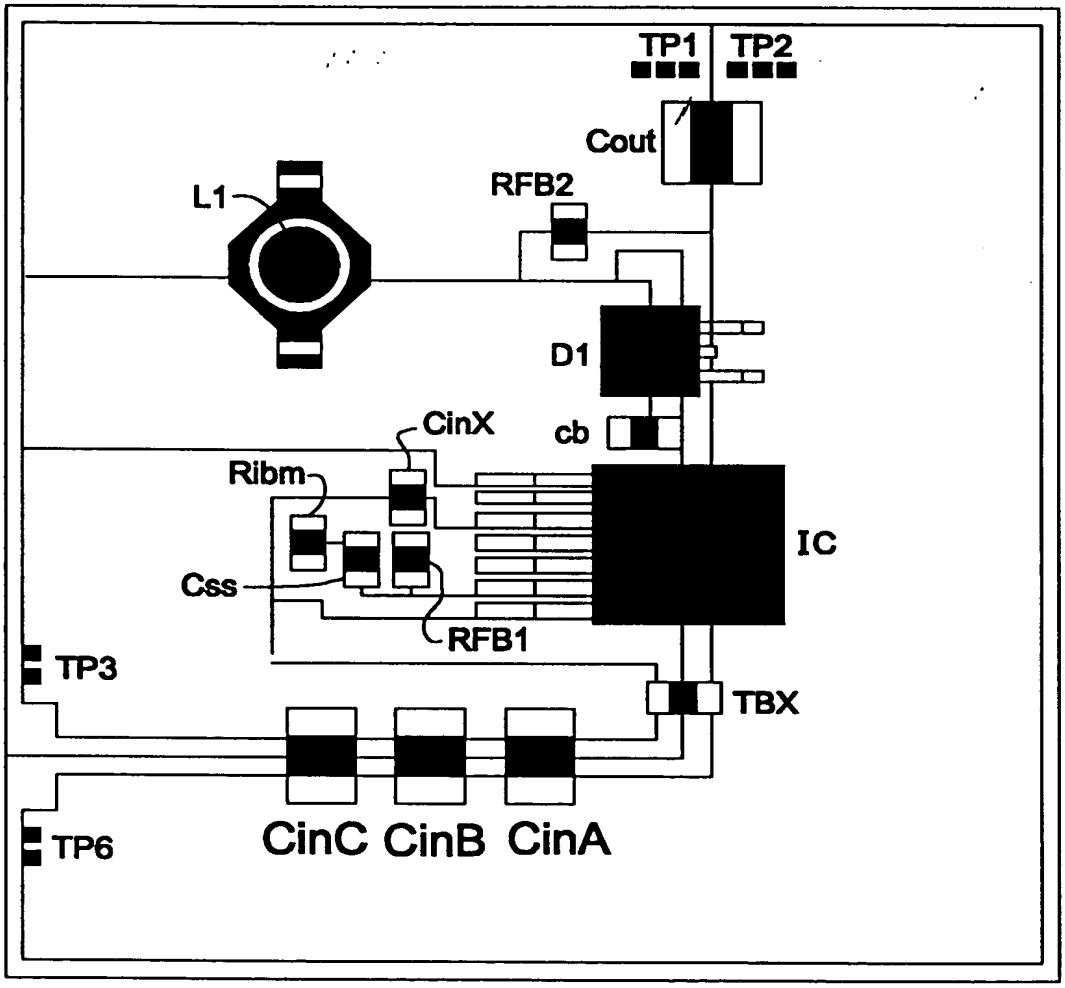



FIGURE 1 - Assembly Diagram

Download the Board Layout in Protel format.

GENERAL DESCRIPTION

Figure 23A

The LM2679 SMD Evaluation Board is designed to provide a flexible PCB platform for customers to develop and test custom power supply designs using tools avalable on the POWER.NATIONAL.COM website. The LM2679BU1PWB is a single sided surface mount layout using 1 oz copper. The overall board dimensions are 2.475" x 2.700" All components are mounted on the topside copper. WEBENCH™ has automatically placed the components on this board to make sure that the input capacitor Cin (and Cinx ) and the diode D1 are as close to the IC as is reasonable minimizing stray circuit inductance. L1 and Cout should also be as close to the IC as reasonable but mostly to minimize the overall dimensions of the required PCB area for the power supply.

The LM2679 SMD Evaluation Board consists of a single layer PCB layout providing major landing areas on the PCB for the power conversion components: Inductor, Diode, Input and Output Capacitors as well as parameter setting small signal passive (resistors and capacitors) in 1206 packages and surface mount test points. Some components are optional or specific to an application, these are highlighted in the schematic. The PCB layout can be optimized for a specific design and lends itself to be dimensionally scalable (i.e. your particular design may have unused board area that can be "cut out" in the final application. This topic is covered in the PCB Layout Optimization section.

## Bill of Materials (BOM).

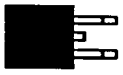
| Item | Manufacturer Part | Qty | Attributes | Component Name(s) |
|---|---|---|---|---|
| 1 | International Rectifier 12CWQ04FN  | 1 | VFatio = 0.52 V | D1 |
| 2 | Keystone 5015 | 4 | | TP1, TP2, TP3, TP6 |
| 3 | National Semiconductor 551011367-011 | 1 | Surface mount, etc | PC Board |
| 4 | Vishay-Sprague 594D156X0035D2T  | 3 | Cap=15uF ESR=0.265 Ohms | Cin |
| 5 | Vishay-Sprague 594D187X0016R2T  | 1 | Cap=180uF ESR=0.065 Ohms | Cout |

Figure 23B

| | | | | |
|---|---|---|---|---|
| 6 | Vishay-Dale CRCW1206-1001FRT1  | 1 | Resistance = 1000 Ohms | Rfb1 |
| 7 | Vishay-Dale CRCW1206-3161FRT1  | 1 | Resistance = 3160 Ohms | Rfb2 |
| 8 | Vishay-Dale CRCW1206-4991FRT1  | 1 | Resistance = 4990 Ohms | Rilim |
| 9 | National Semiconductor LM2679S-ADJ | 1 | Package=S, Voltage option=ADJ Topology=Buck | IC |
| 10 | Coiltronics UP4B-150  | 1 | L = 15uH DCR = 0.02 Ohms | L1 |
| 11 | Vishay-Vitramon VJ1206A392JXAAT  | 1 | Cap = 0.0039uF | Css |
| 12 | Vishay-Vitramon VJ1206Y103KXAAT  | 1 | Cap = 0.01uF | Cb |
| 13 | Vishay-Vitramon VJ1206Y104KXAAT  | 1 | | Cinx |

## SCHEMATIC

The Schematic for the LM2679 is shown in FIGURE 2. U1, L1, D1, Cin and Cout are the basic power conversion components. Cinx as a high frequency bypass to the input to the LM2679. Rfb1, Rfb2, and Cf form the feedback network for th adjustable version of the LM2679. For Fixed output versions a zero Ohm resistor (jumper) should be used for Rfb2 (Rfb1 and Cf should be left off the board), this can be replaced by a copper trace as shown in the PCB Layout Optimization section. A space is reserved for a pull-down resistor, Ron, for the ON/OFF (Active low) pin, this may be desired if a Tri-State gate is driving this pin. Otherwise, if the ON/OFF pin is left floating, the LM2679 is normally ON.

Figure 23C

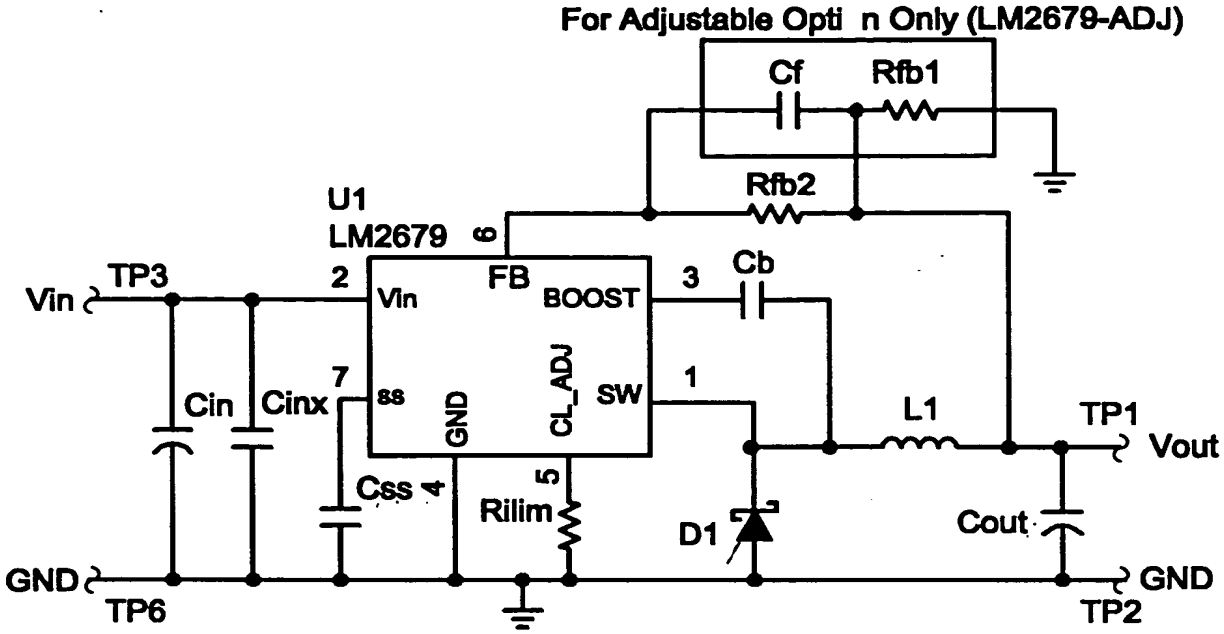



FIGURE 2. - SCHEMATIC

Download the Schematic file in Protel format.

## Component Testing

Some published data on components In datasheets such as Capacitor ESR and Inductor DC resistance is based on conservative values that will quarantee that the components always exceed the specification. For design purposes it is usually better to work with typical values. Since this data is not always available it is a good practice to measure the Capacitance and ESR values of Cin and Cout, and the inductance and DC resistance of L1 before assembly of the board. Any large discrepancies in values should be electrically simulated to check for instabilities and thermally simulated to make sure critical temperatures are not exceeded.

## Soldering Components to the Board

If board assembly is done In house it is best to track down one terminal on the board then solder the other terminal. For the LM2679 the tab on the back of the TO-263 package should be pre-tinned with solder, then tacked into place by one of the pins. To solder the tab down to the board place the iron down on the board while resting against the tab, heating both surfaces simultaneously. Apply light pressure to the top of the plastic case until the solder flows around the part and the part is flush with th PCB. If the solder is not flowing around the board you may need a higher wattage iron (generally 25W to 30W is enough).

## Testing

It is best to power up the board by setting the supply voltage to the lowest operating input voltage (Vin min) and set the supplies current limit to zero. With the supply off connect up the supply to Vin and GND. Connect a DVM to Vout and GND. Turn on the supply and slowly turn up the current limit. It the voltage starts to rise on the supply continue increasing the current while watching the output voltage. If the current increases on the supply but the voltage remains near zero there may be a sh rt r a component misplaced n the board. Power down th board and visually Inspect for solder bridges and recheck th diode and capacitor polarities. Once th supply is operational then more xtensiv testing may includ full load testing, transient load and line tests to compare with simulation results.

Figure 23D

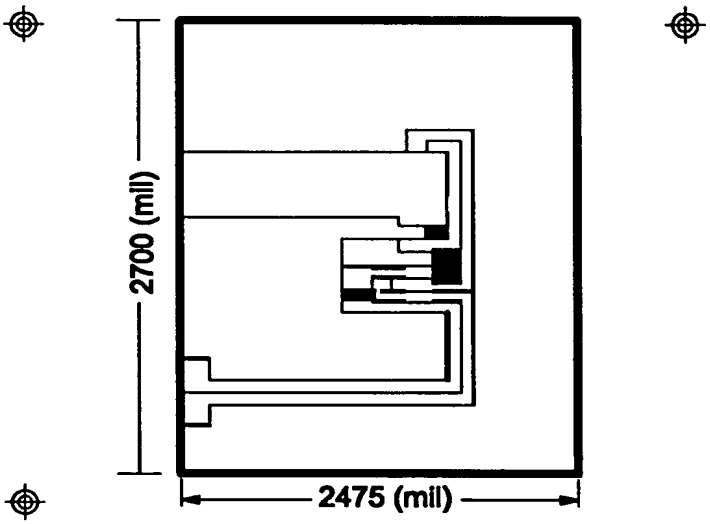
## ARTWORK

FIGURE 3 shows the topsid copper and FIGURE 4 shows the bottom sid copper.

Th intent f this board is to provide a flexible PCB layout to allow many different designs to be implemented using the same layout. In lower power designs you may find unused board space, that is not needed for electrical or thermal purposes. The overall layout lends itself to shrinking the design by trimming off the outer edges of the board.

Download the GERBER file for this PC Board.

NOTES: UNLESS OTHERWISE SPECIFICED
1. NO FAB SHOP LOGO < DATE CODE REQUIRED
2. APPLY GREEN (LPI) SOLDERMASK ON BOTH SIDES
3. NO SILKSCREEN
4. ADD UL RATING ON BOTTOM SIDE
5. MATERIAL : FP - 1, GREEN
6. BOARD THICKNESS : 0.063 WITH 1 oz COPPER
7. FINISH : TIN - LEAD

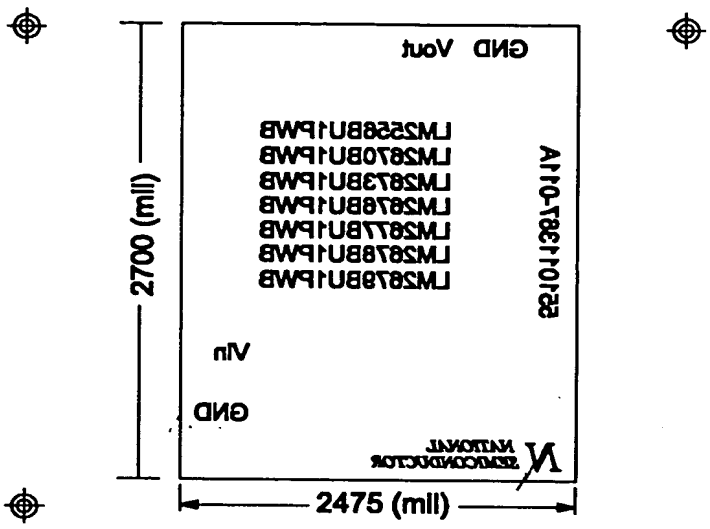



MECHANICAL LAYER 551011367-011A
TOP ETCH 551011367-011A

FIGURE 3 - Topside Cooper

NOTES: UNLESS OTHERWISE SPECIFICED
1. NO FAB SHOP LOGO < DATE CODE REQUIRED
2. APPLY GREEN (LPI) SOLDERMASK ON BOTH SIDES
3. NO SILKSCREEN
4. ADD UL RATING ON BOTTOM SIDE
5. MATERIAL : FP - 1, GREEN
6. BOARD THICKNESS: 0.063 WITH 1 oz COPPER
7. FINISH : TIN - LEAD

Figure 23E




MECHANICAL LAYER 551011367-011A
BOTTOM ETCH 551011367-011A

FIGURE 4 - Bottom Side Copper

Downloadable files

Schematic File

The Schematic File in Protel format.

Board Layout File

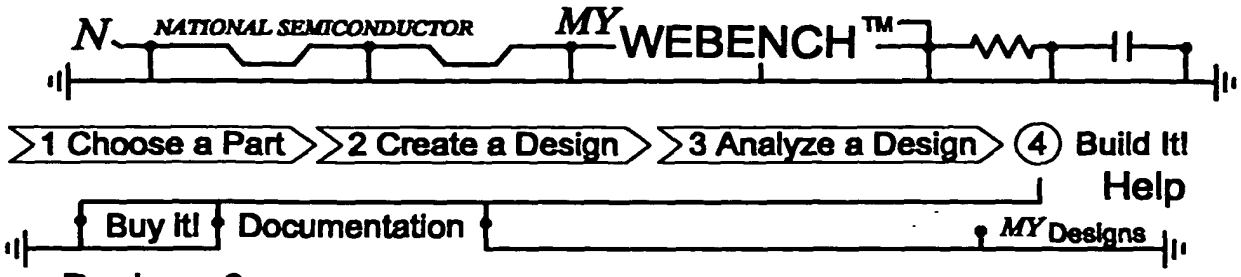
Board Layout in Protel format.

GERBER File

GERBER file for making the PC Board




Figure 23F




Design : 6

## WEBENCH Documentation

Assembly Doc.

The Webench Assembly Document describes in detail how to build your design. It contains the specific assembly diagram for your design, a complete bill of materials and other PC board images and assembly instructions.

Design Doc. ~2440

The WEBENCH Design Document provides a single web page describing your entire design including: design specifications, calculated values, WebSIM simulation results and WebTHERM simulation results.

LM2679 Folder ~2420

LM2679 Product Folder is full of documentation about the National IC used in your design.

My Orders

My Orders is a list of all of your on - line orders.

## WEBENCH Downloads

You can download these files to integrate this design into your local CAD environment. These files are self-extracting zip files. For the files stored in Protel format you will need the Protel application or equivalent CAD software capabl of opening such files.

Schematic File

The Schematic File in Protel format.

Board Layout File

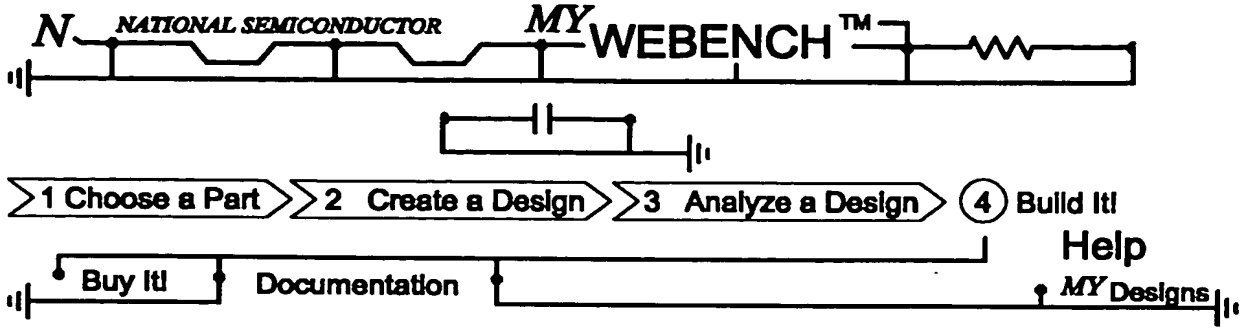
Board Layout in Protel format.

GERBER File

GERBER file for making the PC Board.




Figure 24




## Design Document For Your LM2679 Design # : 7

### Table of Contents:



### Introduction

Custom power supply designs using tools are available on the POWER.NATIONAL.COM website.

### Design Specifications

Design: Design #7
Device: LM2679 Mar 17 2001 3 : 39PM ID: 266796_7

| Design Requirements | Output #1 |
|---|---|
| VinMin = 20.00 V | Vout = 5.00 V |
| VinMax = 22.00 V | Iout = 5.00 A |

### Schematic

Use WebSIM to display your schematic.

### Operating Values

Figure 25A

| Operating Values | | | |
|---|---|---|---|
| # | Description | Parameter | Value |
| 1 | Pulse Width Modulation (PWM) Frequency | Frequency | 260 kHz |
| 2 | Continuous or Discontinuous Conduction Mode, Inductor current goes to zero in Discontinuous Conduction | Mode | Cont |
| 3 | Total Output Power | Pout | 25.0 W |

| Operating Point at Vin = 22.00 V | | | |
|---|---|---|---|
| # | Description | Parameter | Valu |
| 1 | Bode Plot Crossover Frequency, indication of bandwidth of supply | Cross Freq | 97.7 kHz |
| 2 | Steady State PWM Duty Cycle, range limits from 0 to 100 | Duty Cycle | 25.8 % |
| 3 | Steady State Efficiency | Efficiency | 85.3 % |
| 4 | IC Junction Temperature | IC Tj | 120 °C |
| 5 | IC Junction to Ambient Thermal Resistance | ICThetaJA | 34.9 °C/W |
| 6 | Bode Plot Phase Margin | Phase Marg | 71.0 Deg |
| 7 | Peak-to-peak ripple voltage | Vout p-p | 0.07 V |

| Current Analysis | | | |
|---|---|---|---|
| # | Description | Parameter | Valu |
| 1 | Input Capacitor RMS ripple current | Cin IRMS | 2.2 A |
| 2 | Output Capacitor RMS ripple current | Cout IRMS | 0.20 A |
| 3 | Peak Current in IC for Steady State Operating Point | IC Ipk | 5.5 A |
| 4 | ICs Maximum rated peak current | IC Ipk Max | 7.4 A |
| 5 | Average input current | Iin Avg | 2.3 A |
| 6 | Inductor ripple current, peak-to-peak Value | L Ipp | 1.1 A |

Figure 25B

| Power Dissipation Analysis | | | |
|---|---|---|---|
| # | Description | Parameter | Value |
| 1 | Input Capacitor Power Dissipation | Cin Pd | 0.43 W |
| 2 | Output Capacitor Power Dissipation | Cout Pd | 0.0026 W |
| 3 | Diode Power Dissipation | Diode Pd | 1.9 W |
| 4 | IC Power Dissipation | IC Pd | 1.4 W |
| 5 | Inductor Power Dissipation | L Pd | 0.50 W |

## LM2679 The Selected IC

NSID = LM2679S-ADJ
Topology = Buck
Package = S

## BOM - Bill of Materials

| Item | Manufacturer Part | Qty | Attributes | Component Name(s) |
|---|---|---|---|---|
| 1 | International Rectifier 12CWQ04FN  | 1 | VFatio = 0.52 V | D1 |
| 2 | Keystone 5015 | 4 | | TP1, TP2, TP3, TP6 |
| 3 | National Semiconductor 551011367-011 | 1 | Surface Mount, etc | PC Board |
| 4 | Vishay-Sprague 594D156X0035D2T  | 3 | Cap=15uF ESR= 0.265 Ohms | Cin |
| 5 | Vishay-Sprague 594D187X0016R2T  | 1 | Cap=180uF ESR= 0.065 Ohms | Cout |
| 6 | Vishay-Dale CRCW1206-1001FRT1  | 1 | Resistance =1000 Ohms | Rfb1 |
| 7 | Vishay-Dale CRCW1206-3161FRT1  | 1 | Resistance =3160 Ohms | Rfb2 |

Figure 25C

| | | | | |
|---|---|---|---|---|
| 8 | Vishay-Dale CRCW1206-4991FRT1 | 1 | Resistance = 4990 Ohm | Rilim |
| 9 | National Semiconductor LM2679S-ADJ | 1 | Package=S, Voltage option = ADJ Topology = Buck | IC |
| 10 | Coiltronics UP4B-150 | 1 | L = 15uH DCR = 0.02 Ohm | L1 |
| 11 | Vishay-Vitramon VJ1206A392JXAAT | 1 | Cap = 0.0039 uF | Css |
| 12 | Vishay-Vitramon VJ1206Y103KXAAT | 1 | Cap = 0.01 uF | Cb |
| 13 | Vishay-Vitramon VJ1206Y104KXAAT | 1 | | Cinx |

## WebTHERM - Thermal Simulation Results

You have performed 3 WebTHERM thermal simulation(s) on this design. Here are the results of the most recent one.

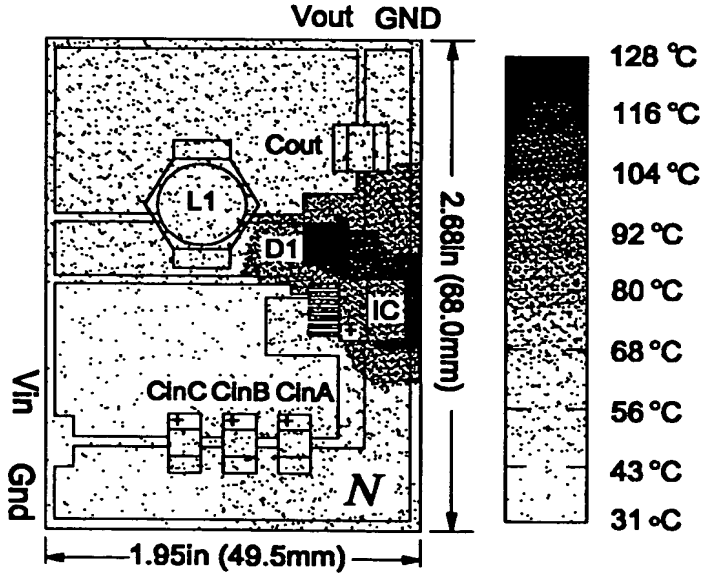



Figure 25D

**Be sure to electrically simulate this design using webSIM.**

## Build It!

**Webench provides both custom and generic evaluation boards to assist you in the building of prototypes of your design. Additionally, for some designs, it is possible to order the complete BOM (Bill of Materials) on-line using Webench.**

**A custom evaluation board is available for your design!**

**Webench provides a custom evaluation board which may be on-line ordered from Pioneer-Standard for designs like yours using National LM2679S-ADJ configured in the Buck topology.**

## Appendices

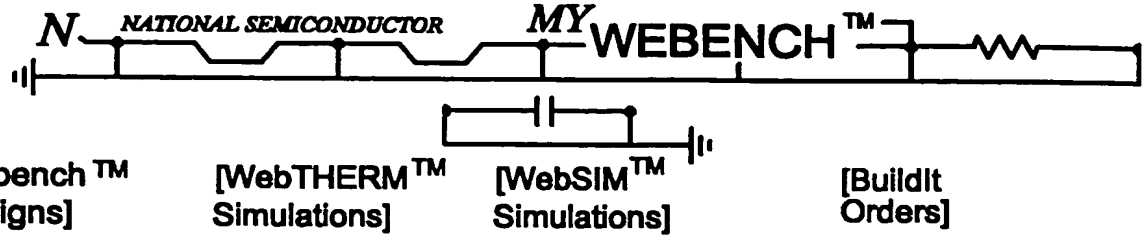
**A. You have performed 3 thermal simulation(s) on this design.**

| ID | Simulation Name | Date |
|---|---|---|
| 1 | Simulation for Design 7 | Mar 17 2001 5 : 10 PM |
| 2 | Simulation for Design 7 | Mar 17 2001 5 : 19 PM |
| 3 | Simulation for Design 7 | Mar 17 2001 5 : 23 PM |

**B. No electrical simulation(s) performed on this design.**




Figure 25E




Tim Sullivan - You have 7 designs stored in your personal workspace

| ID | Design Name | Device | Creation Date | Modification Date | Design Assistant | Comments | Design Operations |
|---|---|---|---|---|---|---|---|
| 7 | Design # 7 | LM2679 | Mar 17 2001 3 : 39PM | Mar 17 2001 3 : 57PM | Power | | Modify, Analyze, Build, Add Notes, Delete, Share |
| 6 | Design # 6 | LM2679 | Mar 15 2001 3 : 23PM | Mar 15 2001 3 : 23PM | Power | | Modify, Analyze, Build, Add Notes, Delete, Share |
| 5 | Design # 5 | LM2679 | Mar 15 2001 11 : 41AM | Mar 15 2001 11 : 44AM | Power | | Modify, Analyze, Build, Add Notes, Delete, Share |
| 4 | Design # 4 | LM2679 | Mar 13 2001 9 : 52AM | Mar 13 2001 10 : 03AM | Power | | Modify, Analyze, Build, Add Notes, Delete, Share |
| 3 | Design # 3 | LM2679 | Mar 13 2001 9 : 52AM | | Power | | Modify, Analyze, Build, Add Notes, Delete, Share |
| 2 | Design # 2 | LM2678 | Mar 13 2001 9: 50AM | | Power | | Modify, Analyze, Build, Add Notes, Delete, Share |
| 1 | Design # 1 | LM2678 | Mar 13 2001 9: 50AM | | Power | | Modify, Analyze, Build, Add Notes, Delete, Share |




Figure 26

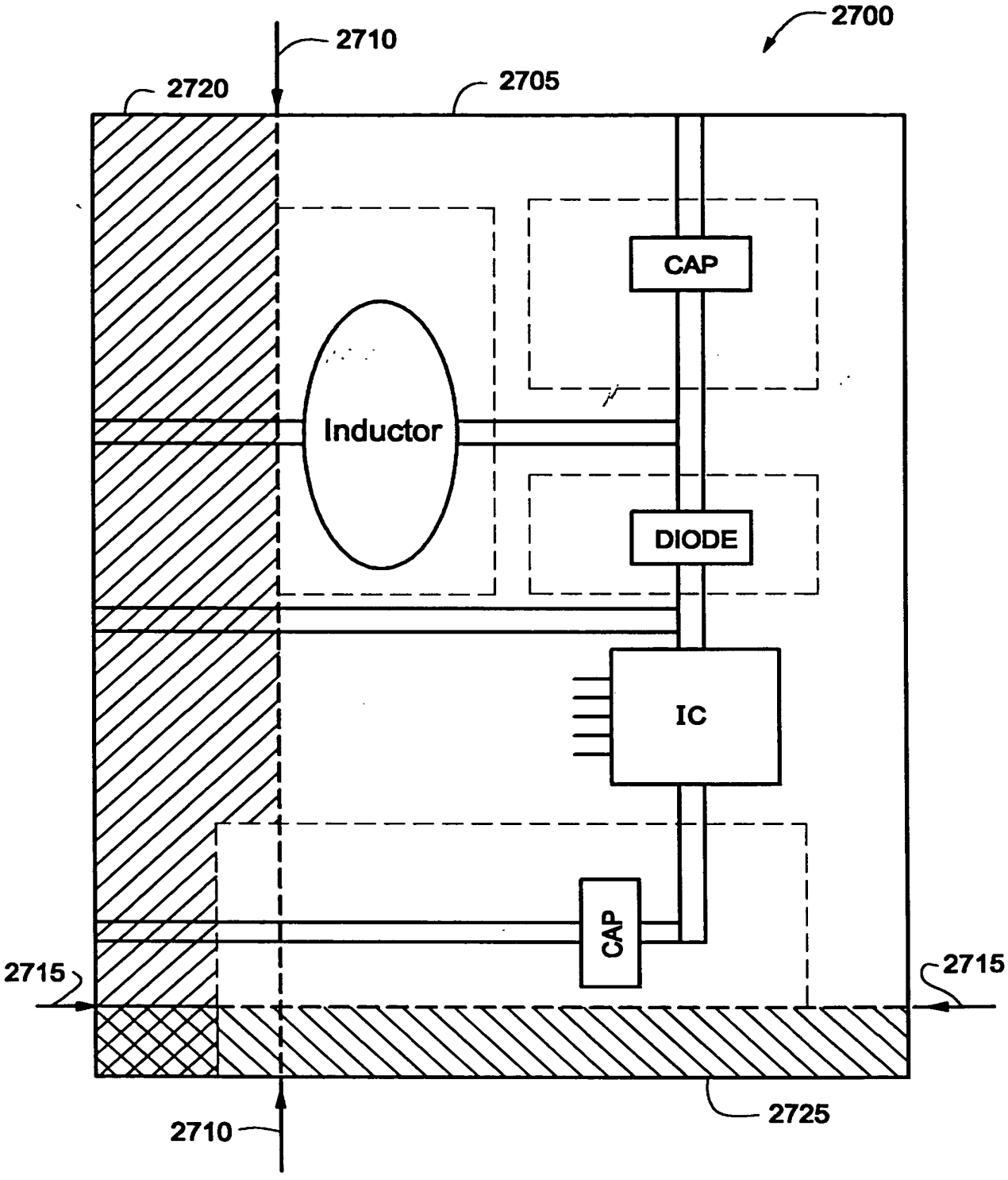

2700
2710
2720
2705
CAP
Inductor
DIODE
IC
CAP
2715
2715
2710
2725

Figure 27

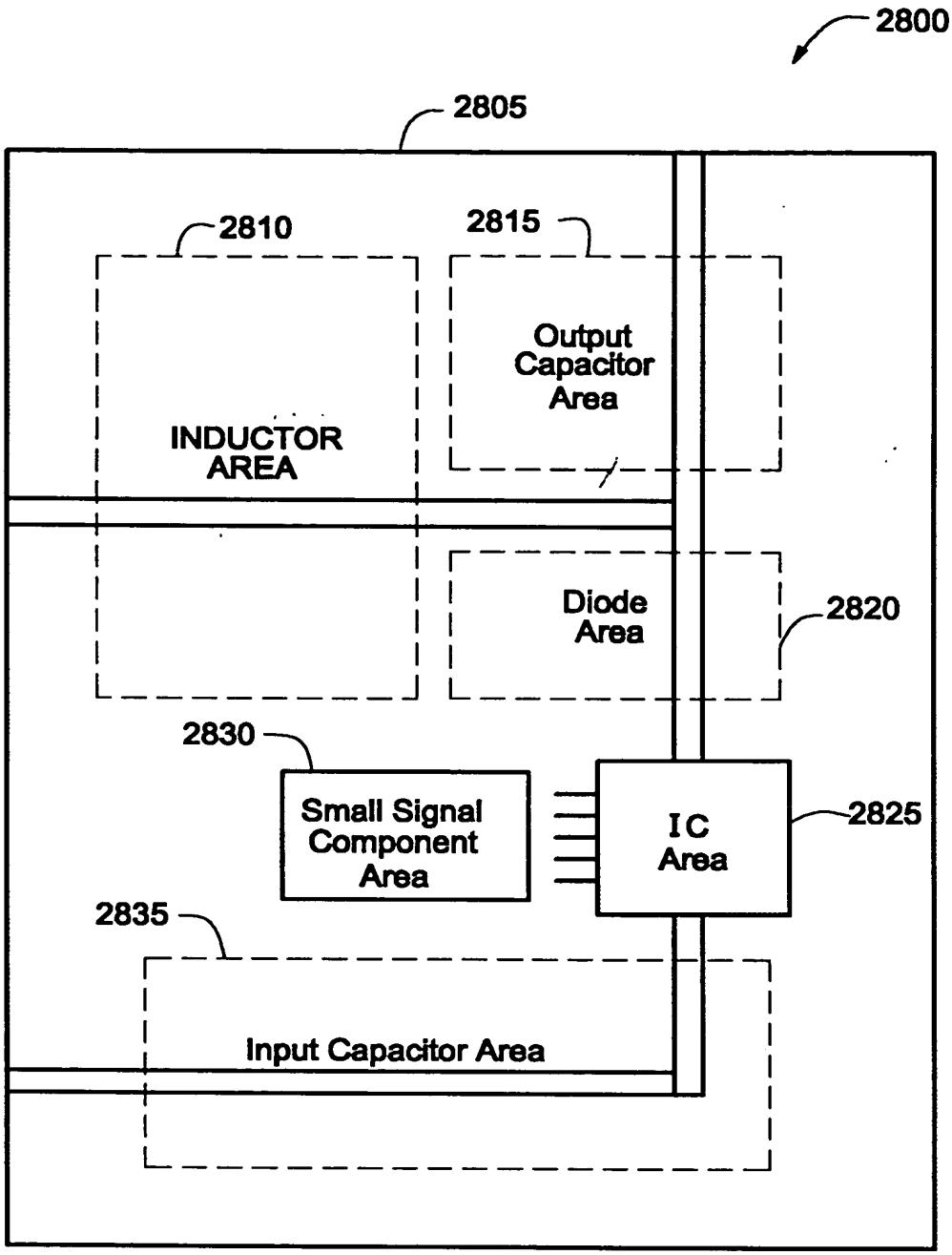

2800
2805
2810
2815
Output Capacitor Area
INDUCTOR AREA
Diode Area
2820
2830
Small Signal Component Area
IC Area
2825
2835
Input Capacitor Area

Figure 28

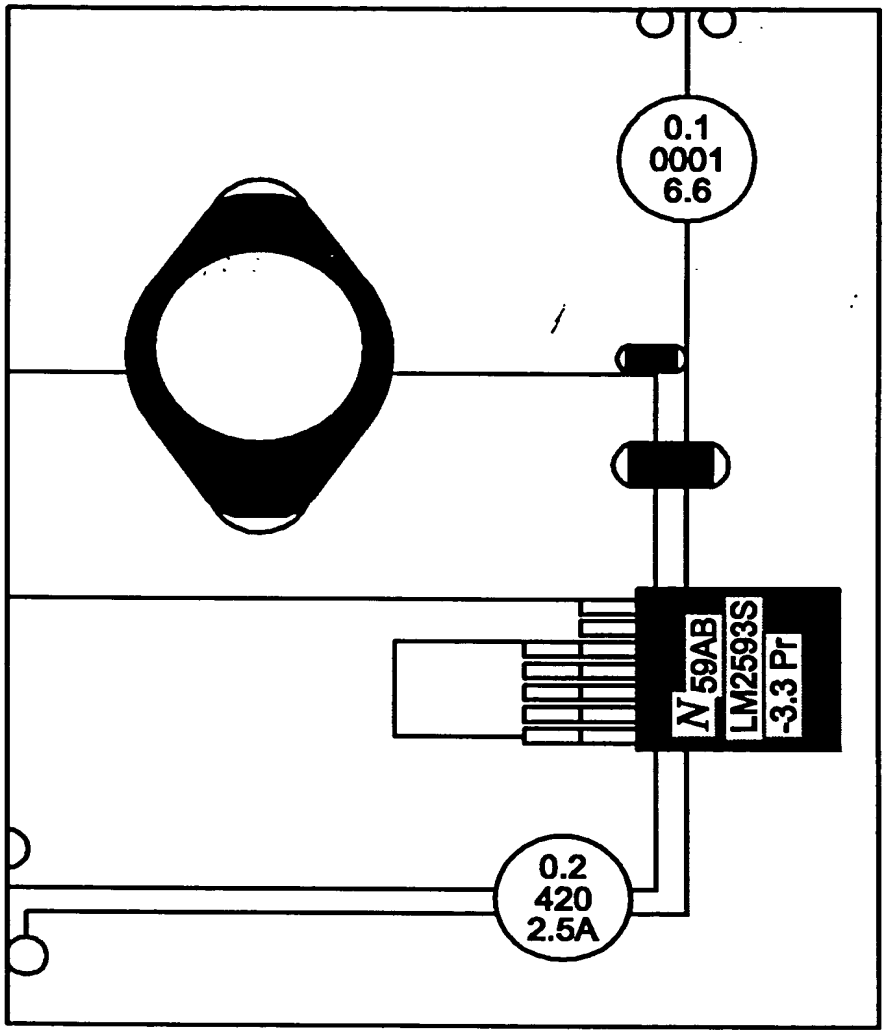



Figure 29A

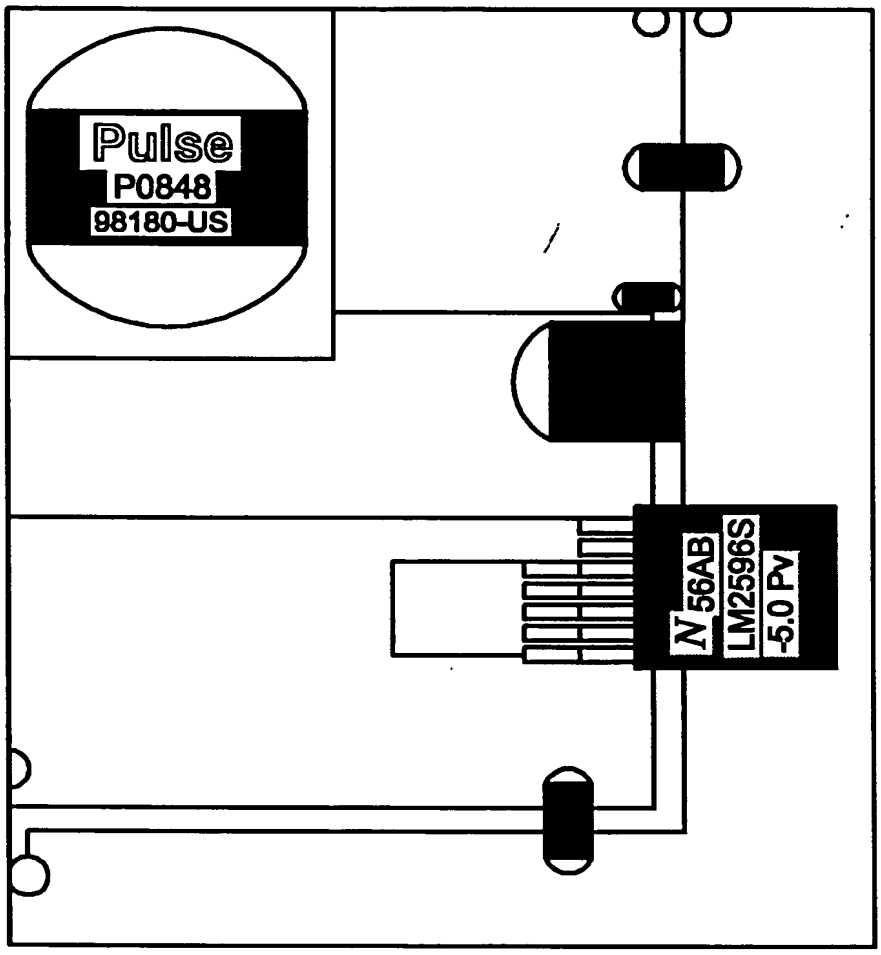



Figure 29B

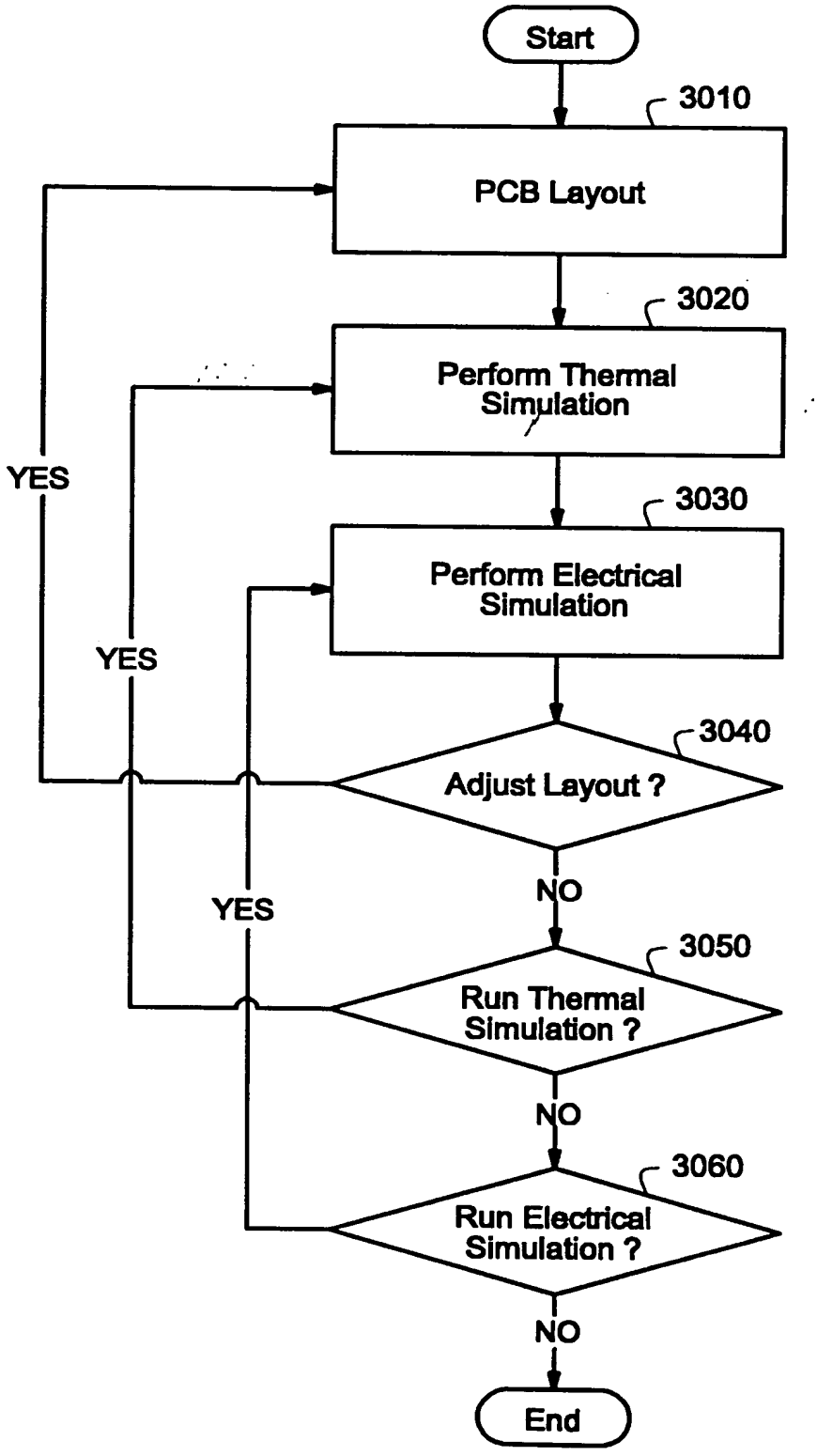
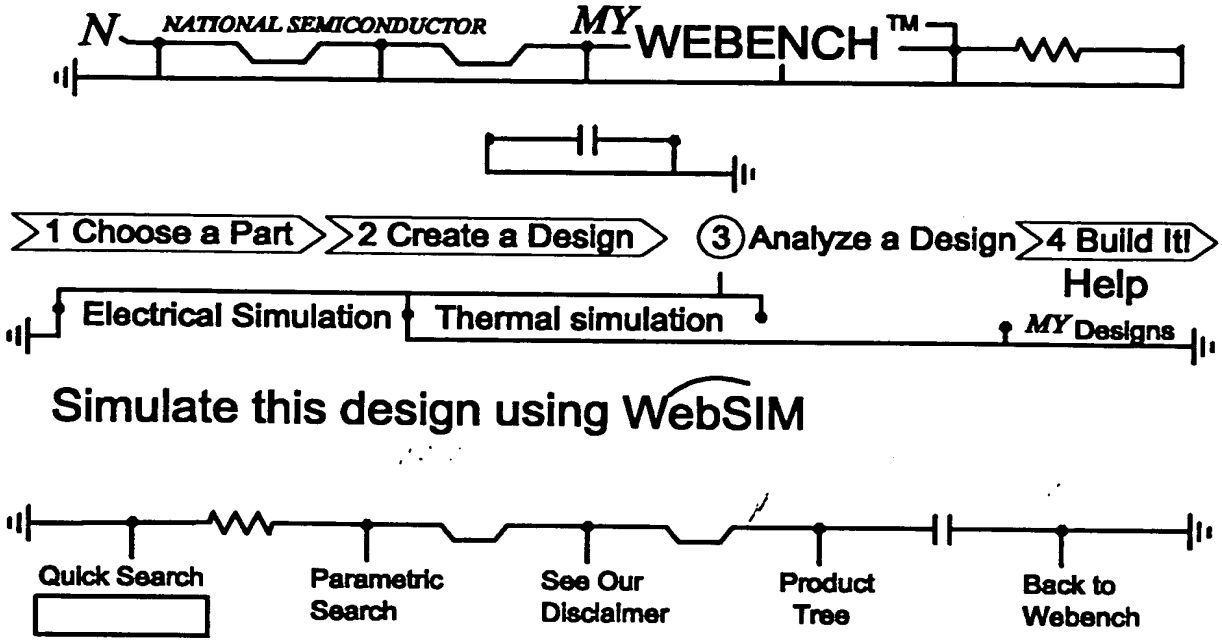

Start
3010
PCB Layout
3020
Perform Thermal Simulation
3030
Perform Electrical Simulation
3040
Adjust Layout ?
3050
Run Thermal Simulation ?
3060
Run Electrical Simulation ?
End
YES
YES
YES
NO
NO
NO

Figure 30


NATIONAL SEMICONDUCTOR
MY WEBENCH™
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Help
Electrical Simulation
Thermal simulation
MY Designs
Simulate this design using WebSIM
Quick Search
Parametric Search
See Our Disclaimer
Product Tree
Back to Webench
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Site Terms & Conditions of Use. Copyright 2001 © National Semiconductor Corporation
Privacy/Security Statement. MY: Preferences. Feedback

Figure 31

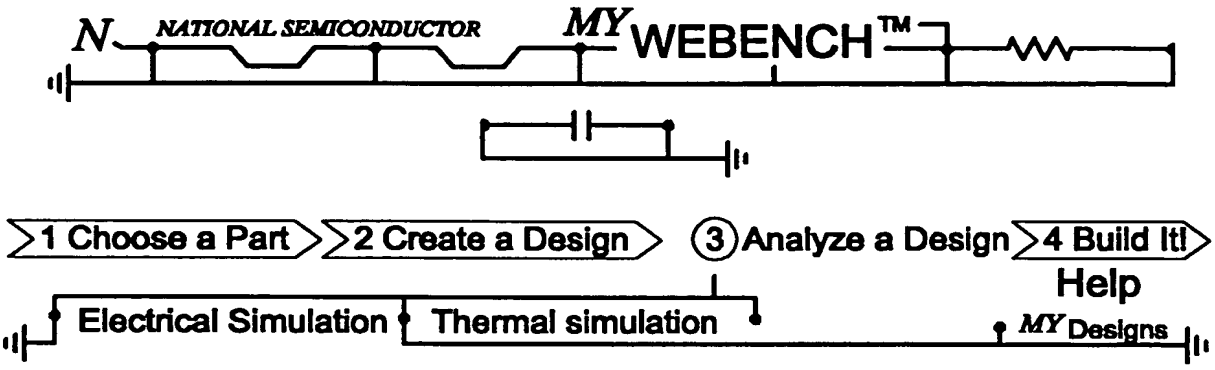

NATIONAL SEMICONDUCTOR
MY WEBENCH™
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Help
Electrical Simulation
Thermal simulation
MY Designs
Simulate this design using WebSIM
WebSIM Simulations for Design ID 7
3210
# | Simulation ID | Date | Notes / Description
2 | 1010802011626869 | Aug 1 2001 6 : 25PM pst |
1 | 1010802011426808 | Aug 1 2001 6 : 23PM pst |
Quick Search
Parametric Search
See Our Disclaimer
Product Tree
Back to Webench
About Languages. Website Guide. About "Cookies". National is QS 9000 Certified
Site Terms & Conditions of Use. Copyright 2001 © National Semiconductor Corporation
Privacy/Security Statement. MY: Preferences. Feedback

Figure 32

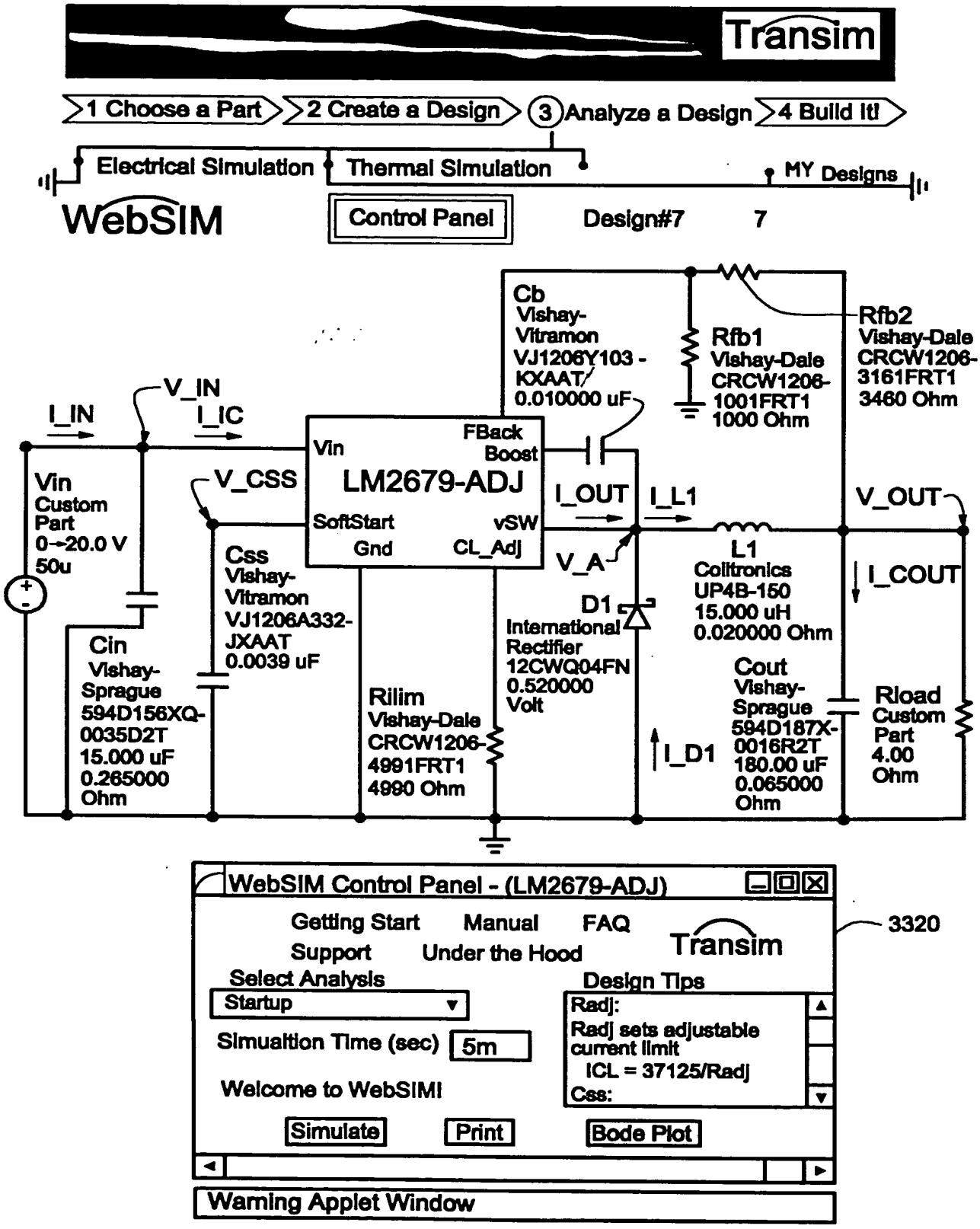

Transim
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Electrical Simulation
Thermal Simulation
MY Designs
WebSIM
Control Panel
Design#7
7
Cb
Vishay-Vitramon
VJ1206Y103-KXAAT/
0.010000 uF
Rfb1
Vishay-Dale
CRCW1206-1001FRT1
1000 Ohm
Rfb2
Vishay-Dale
CRCW1206-3161FRT1
3460 Ohm
V_IN
I_IN
I_IC
Vin
FBack
Boost
LM2679-ADJ
SoftStart
vSW
Gnd
CL_Adj
V_CSS
I_OUT
I_L1
V_OUT
V_A
Vin
Custom Part
0-20.0 V
50u
Css
Vishay-Vitramon
VJ1206A332-JXAAT
0.0039 uF
L1
Coiltronics
UP4B-150
15.000 uH
0.020000 Ohm
I_COUT
D1
International Rectifier
12CWQ04FN
0.520000 Volt
Cin
Vishay-Sprague
594D156XQ-0035D2T
15.000 uF
0.265000 Ohm
Rilim
Vishay-Dale
CRCW1206-4991FRT1
4990 Ohm
Cout
Vishay-Sprague
594D187X-0016R2T
180.00 uF
0.065000 Ohm
I_D1
Rload
Custom Part
4.00 Ohm
WebSIM Control Panel - (LM2679-ADJ)
Getting Start
Manual
FAQ
Support
Under the Hood
Transim
3320
Select Analysis
Startup
Design Tips
Radj:
Radj sets adjustable current limit
ICL = 37125/Radj
Css:
Simualtion Time (sec)
5m
Welcome to WebSIM!
Simulate
Print
Bode Plot
Warning Applet Window

Figure 33

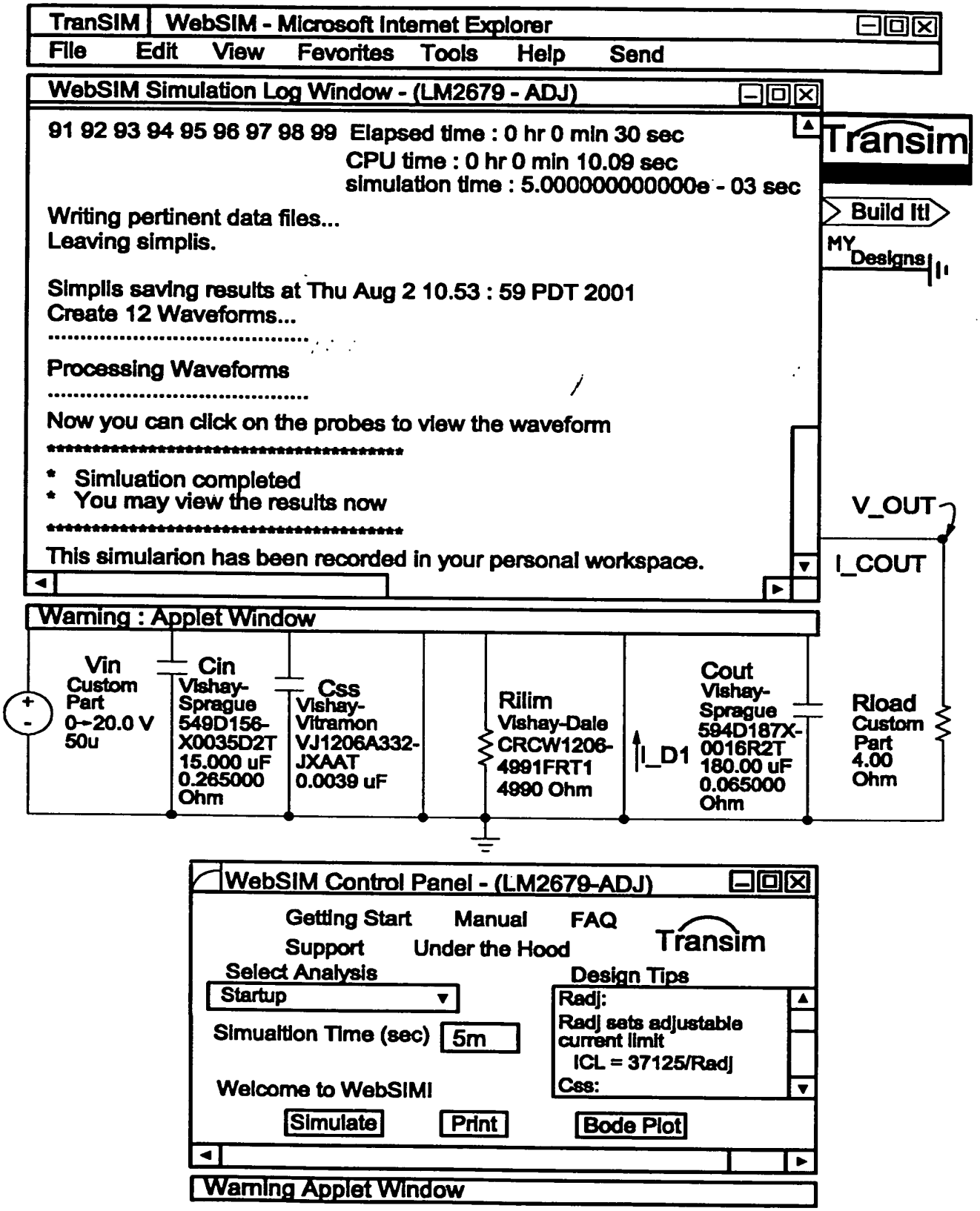

TranSIM
WebSIM - Microsoft Internet Explorer
File Edit View Fevorites Tools Help Send
WebSIM Simulation Log Window - (LM2679 - ADJ)
91 92 93 94 95 96 97 98 99 Elapsed time : 0 hr 0 min 30 sec
CPU time : 0 hr 0 min 10.09 sec
simulation time : 5.000000000000e - 03 sec
Writing pertinent data files...
Leaving simplis.
Simplis saving results at Thu Aug 2 10.53 : 59 PDT 2001
Create 12 Waveforms...
Processing Waveforms
Now you can click on the probes to view the waveform
* Simluation completed
* You may view the results now
This simularion has been recorded in your personal workspace.
Transim
Build It!
MY Designs
V_OUT
I_COUT
Warning : Applet Window
Vin
Custom Part
0-20.0 V
50u
Cin
Vishay-Sprague
549D156-X0035D2T
15.000 uF
0.265000 Ohm
Css
Vishay-Vitramon
VJ1206A332-JXAAT
0.0039 uF
Rilim
Vishay-Dale
CRCW1206-4991FRT1
4990 Ohm
I_D1
Cout
Vishay-Sprague
594D187X-0016R2T
180.00 uF
0.065000 Ohm
Rload
Custom Part
4.00 Ohm
WebSIM Control Panel - (LM2679-ADJ)
Getting Start Manual FAQ
Support Under the Hood
Transim
Select Analysis
Startup
Simualtion Time (sec) 5m
Welcome to WebSIM!
Simulate Print Bode Plot
Design Tips
Radj:
Radj sets adjustable current limit
ICL = 37125/Radj
Css:
Warning Applet Window

Figure 34

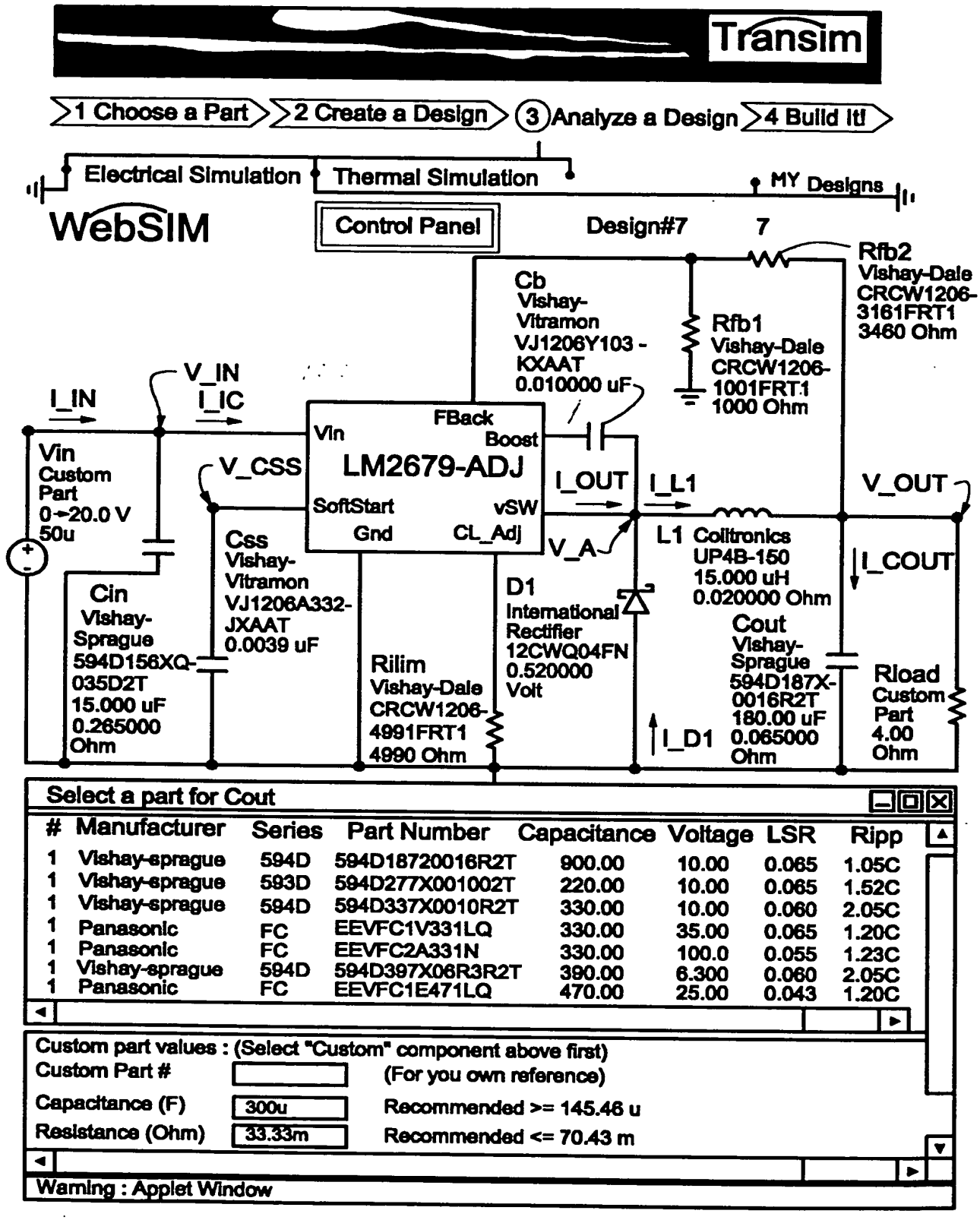

Transim
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Electrical Simulation
Thermal Simulation
MY Designs
WebSIM
Control Panel
Design#7
7
Rfb2
Vishay-Dale
CRCW1206-3161FRT1
3460 Ohm
Cb
Vishay-Vitramon
VJ1206Y103-KXAAT
0.010000 uF
Rfb1
Vishay-Dale
CRCW1206-1001FRT1
1000 Ohm
V_IN
I_IN
I_IC
FBack
Vin
Boost
LM2679-ADJ
SoftStart
vSW
Gnd
CL_Adj
V_CSS
I_OUT
I_L1
V_OUT
Vin
Custom Part
0-20.0 V
50u
Css
Vishay-Vitramon
VJ1206A332-JXAAT
0.0039 uF
V_A
L1 Coiltronics
UP4B-150
15.000 uH
0.020000 Ohm
I_COUT
Cin
Vishay-Sprague
594D156XQ-035D2T
15.000 uF
0.265000 Ohm
D1
International Rectifier
12CWQ04FN
0.520000 Volt
Cout
Vishay-Sprague
594D187X-0016R2T
180.00 uF
0.065000 Ohm
Rilim
Vishay-Dale
CRCW1206-4991FRT1
4990 Ohm
I_D1
Rload
Custom Part
4.00 Ohm
Select a part for Cout
# Manufacturer Series Part Number Capacitance Voltage LSR Ripp
1 Vishay-sprague 594D 594D18720016R2T 900.00 10.00 0.065 1.05C
1 Vishay-sprague 593D 594D277X001002T 220.00 10.00 0.065 1.52C
1 Vishay-sprague 594D 594D337X0010R2T 330.00 10.00 0.060 2.05C
1 Panasonic FC EEVFC1V331LQ 330.00 35.00 0.065 1.20C
1 Panasonic FC EEVFC2A331N 330.00 100.0 0.055 1.23C
1 Vishay-sprague 594D 594D397X06R3R2T 390.00 6.300 0.060 2.05C
1 Panasonic FC EEVFC1E471LQ 470.00 25.00 0.043 1.20C
Custom part values : (Select "Custom" component above first)
Custom Part #
(For you own reference)
Capacitance (F) 300u
Recommended >= 145.46 u
Resistance (Ohm) 33.33m
Recommended <= 70.43 m
Warning : Applet Window

Figure 35

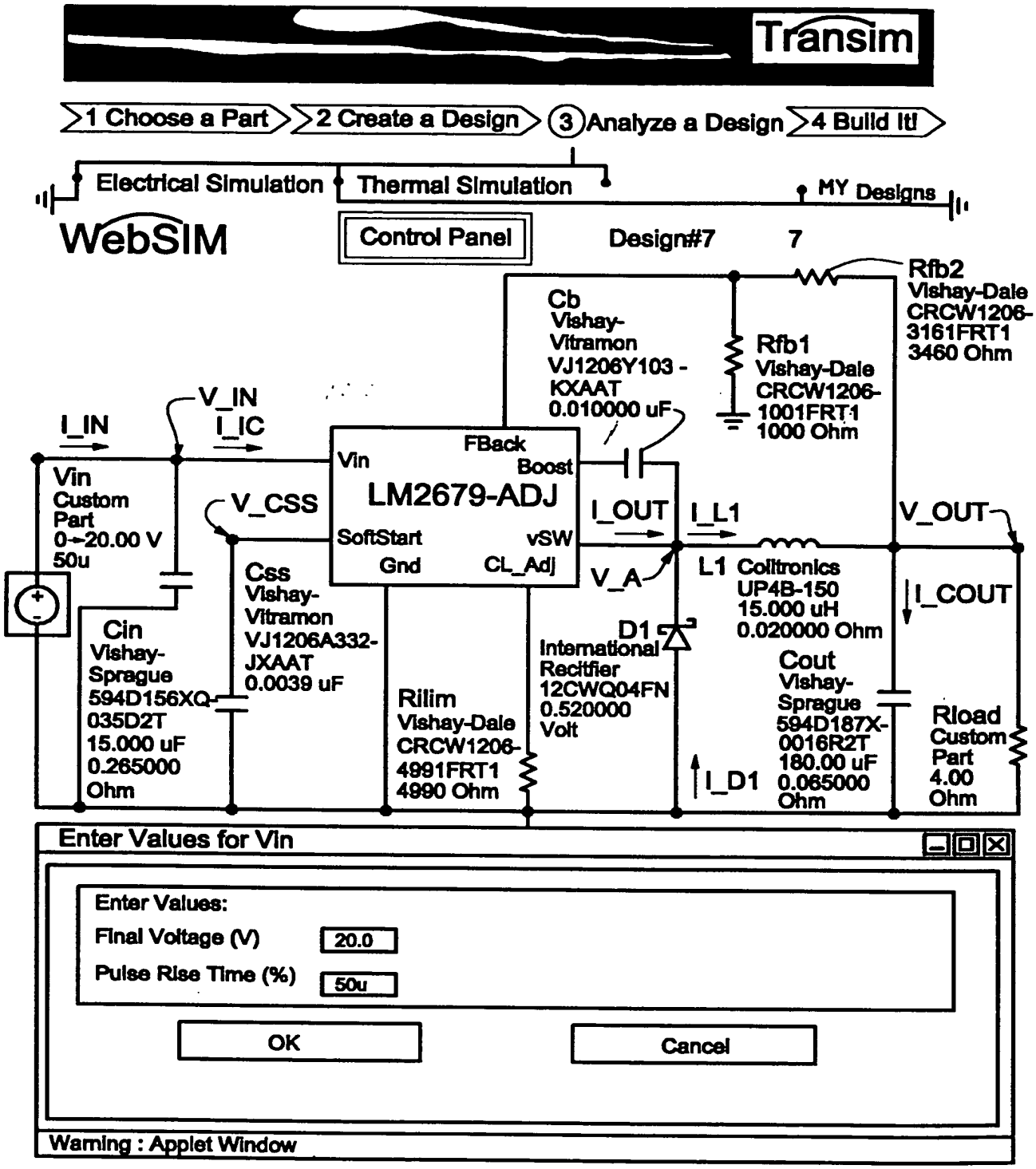

Transim
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Electrical Simulation
Thermal Simulation
MY Designs
WebSIM
Control Panel
Design#7
7
Rfb2
Vishay-Dale
CRCW1206-
3161FRT1
3460 Ohm
Cb
Vishay-
Vitramon
VJ1206Y103 -
KXAAT
0.010000 uF
Rfb1
Vishay-Dale
CRCW1206-
1001FRT1
1000 Ohm
I_IN
V_IN
I_IC
FBack
Vin
Boost
LM2679-ADJ
SoftStart
vSW
Gnd
CL_Adj
Vin
Custom
Part
0-20.00 V
50u
V_CSS
I_OUT
I_L1
V_OUT
V_A
L1 Coiltronics
UP4B-150
15.000 uH
0.020000 Ohm
I_COUT
Css
Vishay-
Vitramon
VJ1206A332-
JXAAT
0.0039 uF
D1
International
Recitfier
12CWQ04FN
0.520000
Volt
Cout
Vishay-
Sprague
594D187X-
0016R2T
180.00 uF
0.065000
Ohm
Cin
Vishay-
Sprague
594D156XQ-
035D2T
15.000 uF
0.265000
Ohm
Rilim
Vishay-Dale
CRCW1206-
4991FRT1
4990 Ohm
I_D1
Rload
Custom
Part
4.00
Ohm
Enter Values for Vin
Enter Values:
Final Voltage (V)
20.0
Pulse Rise Time (%)
50u
OK
Cancel
Warning : Applet Window

Figure 36

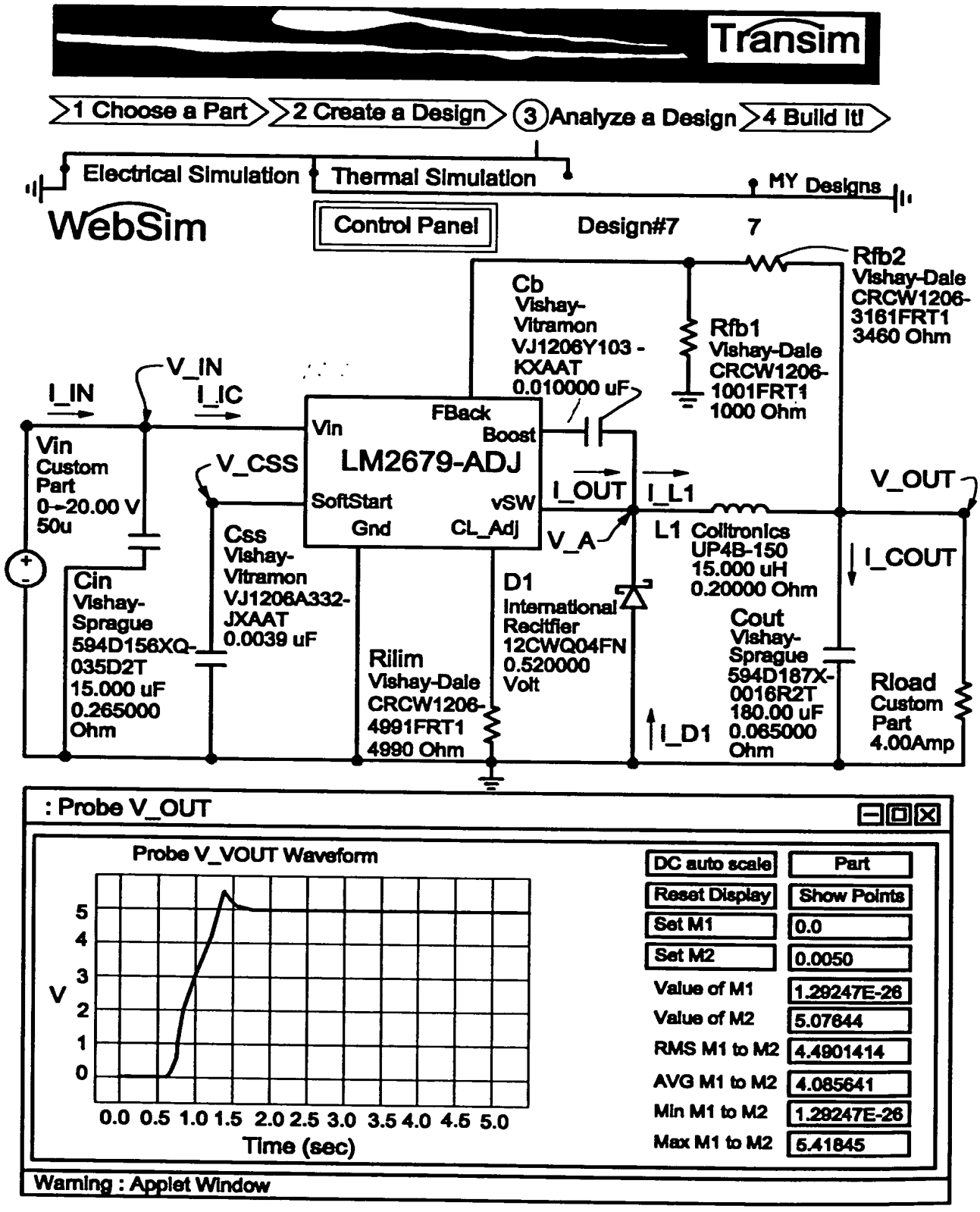

Transim
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Electrical Simulation
Thermal Simulation
MY Designs
WebSim
Control Panel
Design#7
7
Rfb2
Vishay-Dale
CRCW1206-
3161FRT1
3460 Ohm
Cb
Vishay-
Vitramon
VJ1206Y103 -
KXAAT
0.010000 uF
Rfb1
Vishay-Dale
CRCW1206-
1001FRT1
1000 Ohm
V_IN
I_IN
I_IC
FBack
Vin
Boost
LM2679-ADJ
SoftStart
vSW
Gnd
CL_Adj
V_CSS
I_OUT
I_L1
V_OUT
V_A
Vin
Custom
Part
0-20.00 V
50u
L1 Coiltronics
UP4B-150
15.000 uH
0.20000 Ohm
I_COUT
Css
Vishay-
Vitramon
VJ1206A332-
JXAAT
0.0039 uF
D1
International
Rectifier
12CWQ04FN
0.520000
Volt
Cin
Vishay-
Sprague
594D156XQ-
035D2T
15.000 uF
0.265000
Ohm
Cout
Vishay-
Sprague
594D187X-
0016R2T
180.00 uF
0.065000
Ohm
Rilim
Vishay-Dale
CRCW1206-
4991FRT1
4990 Ohm
I_D1
Rload
Custom
Part
4.00Amp
: Probe V_OUT
Probe V_VOUT Waveform
V
5
4
3
2
1
0
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
Time (sec)
DC auto scale
Part
Reset Display
Show Points
Set M1
0.0
Set M2
0.0050
Value of M1
1.29247E-26
Value of M2
5.07644
RMS M1 to M2
4.4901414
AVG M1 to M2
4.085641
Min M1 to M2
1.29247E-26
Max M1 to M2
5.41845
Warning : Applet Window

Figure 37

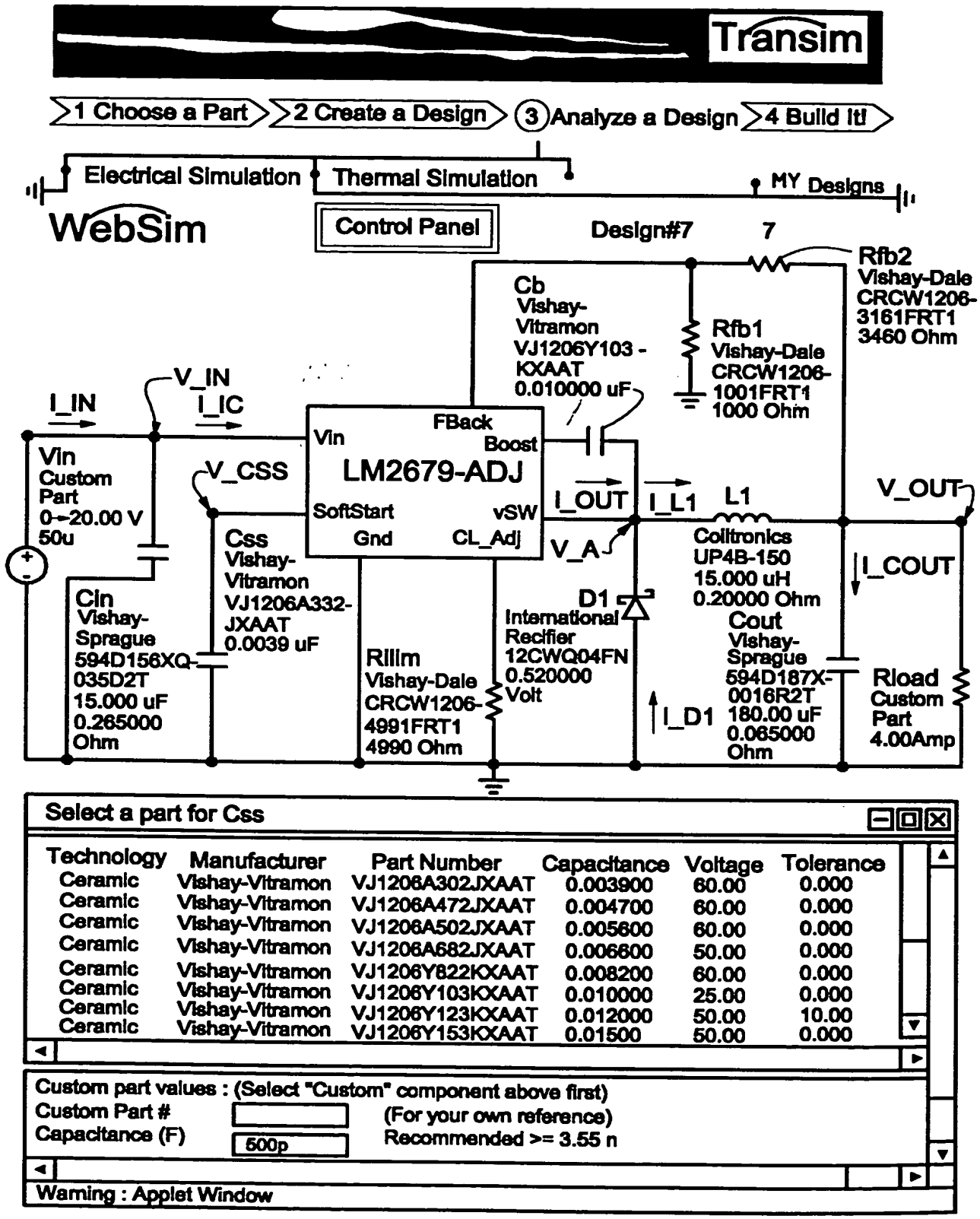

Transim
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Electrical Simulation
Thermal Simulation
MY Designs
WebSim
Control Panel
Design#7
7
Rfb2
Vishay-Dale
CRCW1206-
3161FRT1
3460 Ohm
Cb
Vishay-
Vitramon
VJ1206Y103 -
KXAAT
0.010000 uF
Rfb1
Vishay-Dale
CRCW1206-
1001FRT1
1000 Ohm
V_IN
I_IN
I_IC
FBack
Vin
Boost
LM2679-ADJ
SoftStart
vSW
Gnd
CL_Adj
Vin
Custom
Part
0-20.00 V
50u
V_CSS
I_OUT
I_L1
L1
V_OUT
Css
Vishay-
Vitramon
VJ1206A332-
JXAAT
0.0039 uF
V_A
Coiltronics
UP4B-150
15.000 uH
0.20000 Ohm
I_COUT
Cin
Vishay-
Sprague
594D156XQ-
035D2T
15.000 uF
0.265000
Ohm
D1
International
Recifier
12CWQ04FN
0.520000
Volt
Cout
Vishay-
Sprague
594D187X-
0016R2T
180.00 uF
0.065000
Ohm
Rload
Custom
Part
4.00Amp
RIlim
Vishay-Dale
CRCW1206-
4991FRT1
4990 Ohm
I_D1
Select a part for Css
Technology
Manufacturer
Part Number
Capacitance
Voltage
Tolerance
Ceramic Vishay-Vitramon VJ1206A302JXAAT 0.003900 60.00 0.000
Ceramic Vishay-Vitramon VJ1206A472JXAAT 0.004700 60.00 0.000
Ceramic Vishay-Vitramon VJ1206A502JXAAT 0.005600 60.00 0.000
Ceramic Vishay-Vitramon VJ1206A682JXAAT 0.006600 50.00 0.000
Ceramic Vishay-Vitramon VJ1206Y822KXAAT 0.008200 60.00 0.000
Ceramic Vishay-Vitramon VJ1206Y103KXAAT 0.010000 25.00 0.000
Ceramic Vishay-Vitramon VJ1206Y123KXAAT 0.012000 50.00 10.00
Ceramic Vishay-Vitramon VJ1206Y153KXAAT 0.01500 50.00 0.000
Custom part values : (Select "Custom" component above first)
Custom Part #
(For your own reference)
Capacitance (F)
500p
Recommended >= 3.55 n
Warning : Applet Window

Figure 38

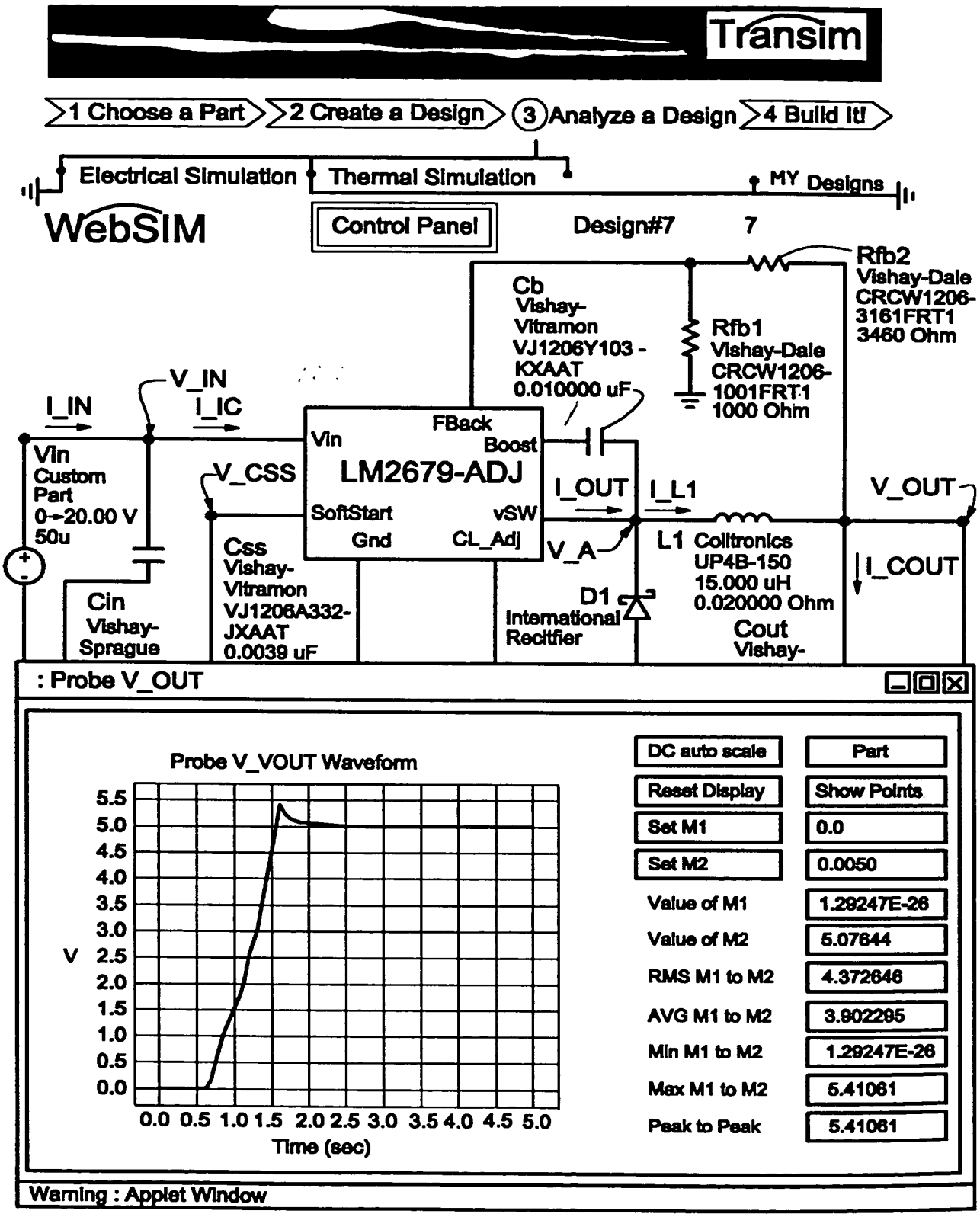
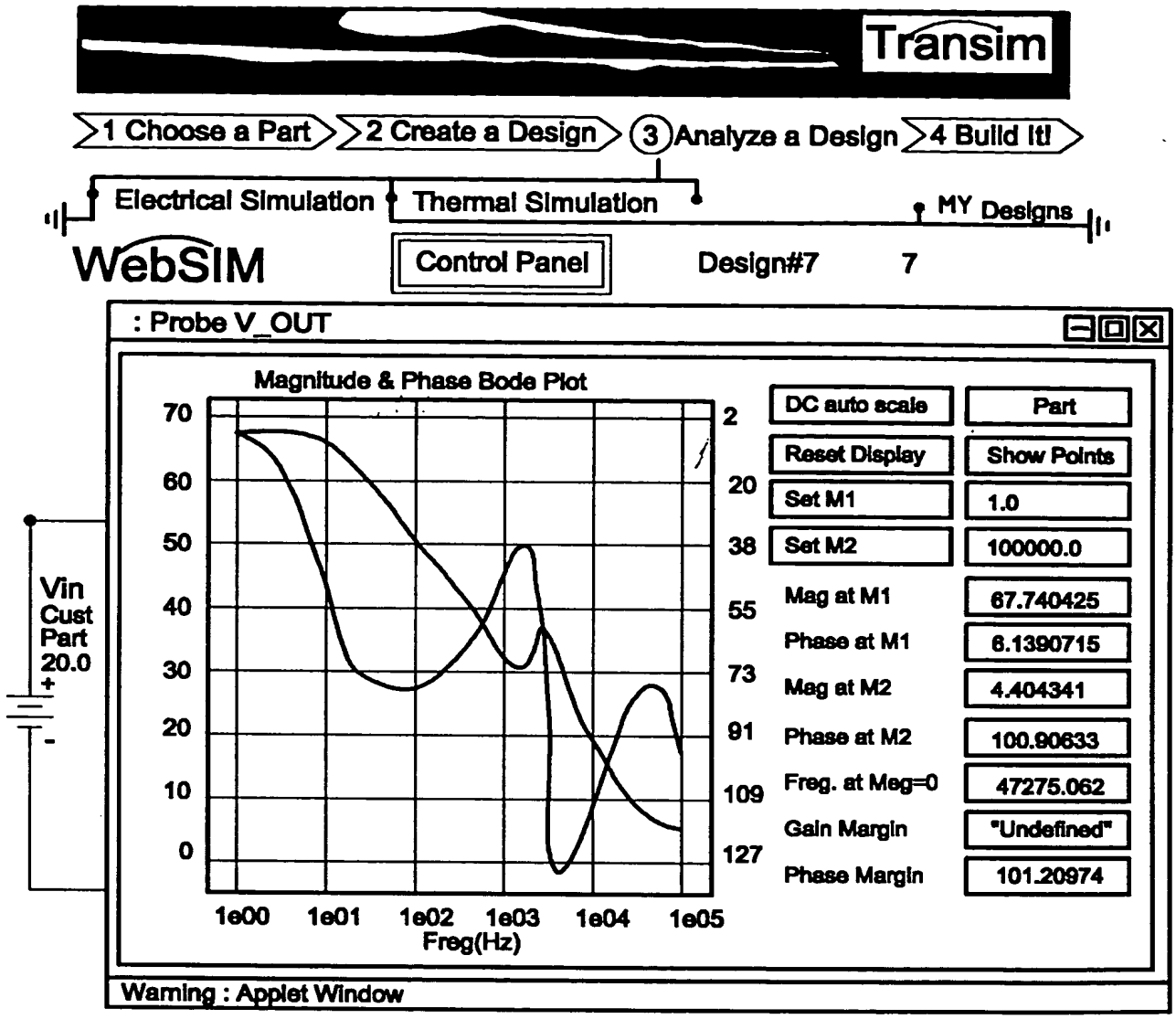

Transim
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Electrical Simulation
Thermal Simulation
MY Designs
WebSIM
Control Panel
Design#7
7
Rfb2
Vishay-Dale
CRCW1206-
3161FRT1
3460 Ohm
Cb
Vishay-
Vitramon
VJ1206Y103 -
KXAAT
0.010000 uF
Rfb1
Vishay-Dale
CRCW1206-
1001FRT1
1000 Ohm
V_IN
I_IN
I_IC
FBack
Vin
Boost
LM2679-ADJ
SoftStart
vSW
Gnd
CL_Adj
Vin
Custom
Part
0-20.00 V
50u
V_CSS
I_OUT
I_L1
V_OUT
V_A
L1 Coiltronics
UP4B-150
15.000 uH
0.020000 Ohm
I_COUT
Cin
Vishay-
Sprague
Css
Vishay-
Vitramon
VJ1206A332-
JXAAT
0.0039 uF
D1
International
Rectifier
Cout
Vishay-
: Probe V_OUT
Probe V_VOUT Waveform
V
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
Time (sec)
DC auto scale
Part
Reset Display
Show Points
Set M1
0.0
Set M2
0.0050
Value of M1
1.29247E-26
Value of M2
5.07644
RMS M1 to M2
4.372646
AVG M1 to M2
3.902295
Min M1 to M2
1.29247E-26
Max M1 to M2
5.41061
Peak to Peak
5.41061
Warning : Applet Window

Figure 39


Transim
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Electrical Simulation
Thermal Simulation
MY Designs
WebSIM
Control Panel
Design#7
7
: Probe V_OUT
Magnitude & Phase Bode Plot
70
60
50
40
30
20
10
0
2
20
38
55
73
91
109
127
1e00
1e01
1e02
1e03
1e04
1e05
Freq(Hz)
DC auto scale
Part
Reset Display
Show Points
Set M1
1.0
Set M2
100000.0
Mag at M1
67.740425
Phase at M1
6.1390715
Mag at M2
4.404341
Phase at M2
100.90633
Freq. at Mag=0
47275.062
Gain Margin
"Undefined"
Phase Margin
101.20974
Vin
Cust
Part
20.0
+
-
Warning : Applet Window

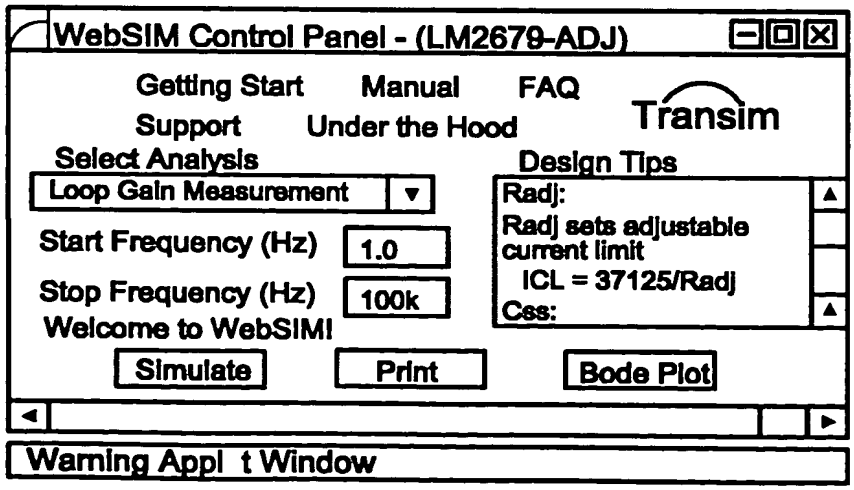

WebSIM Control Panel - (LM2679-ADJ)
Getting Start
Manual
FAQ
Support
Under the Hood
Transim
Select Analysis
Loop Gain Measurement
Start Frequency (Hz)
1.0
Stop Frequency (Hz)
100k
Welcome to WebSIM!
Design Tips
Radj:
Radj sets adjustable current limit
ICL = 37125/Radj
Css:
Simulate
Print
Bode Plot
Warning Appl t Window

Figure 40

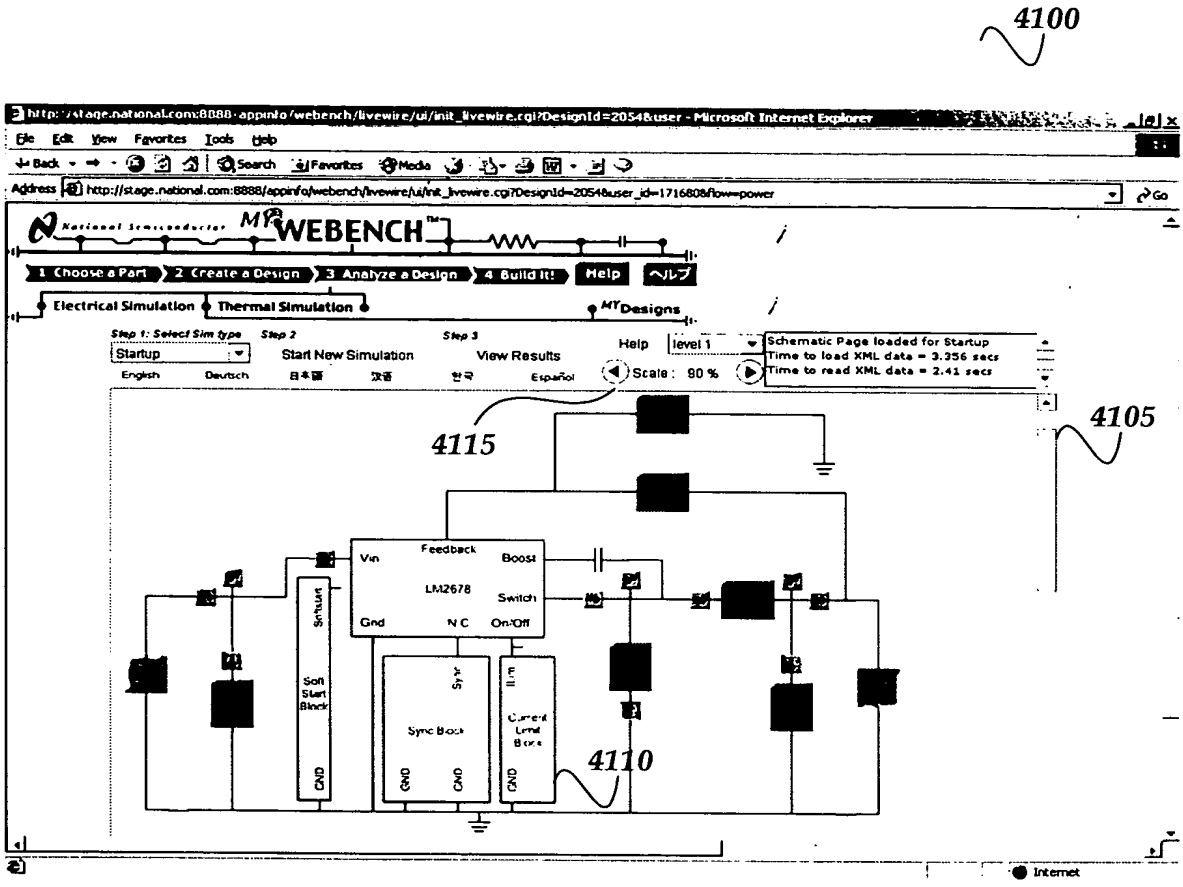

4100
4105
4115
4110
WEBENCH
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Help
Electrical Simulation
Thermal Simulation
Startup
Start New Simulation
View Results
Schematic Page loaded for Startup
Time to load XML data = 3.356 secs
Time to read XML data = 2.41 secs
Feedback
Vin
Boost
LM2678
Switch
Gnd
N C
On/Off
Soft Start Block
Sync Block
Current Limit Block
GND
Internet

*Fig.41*

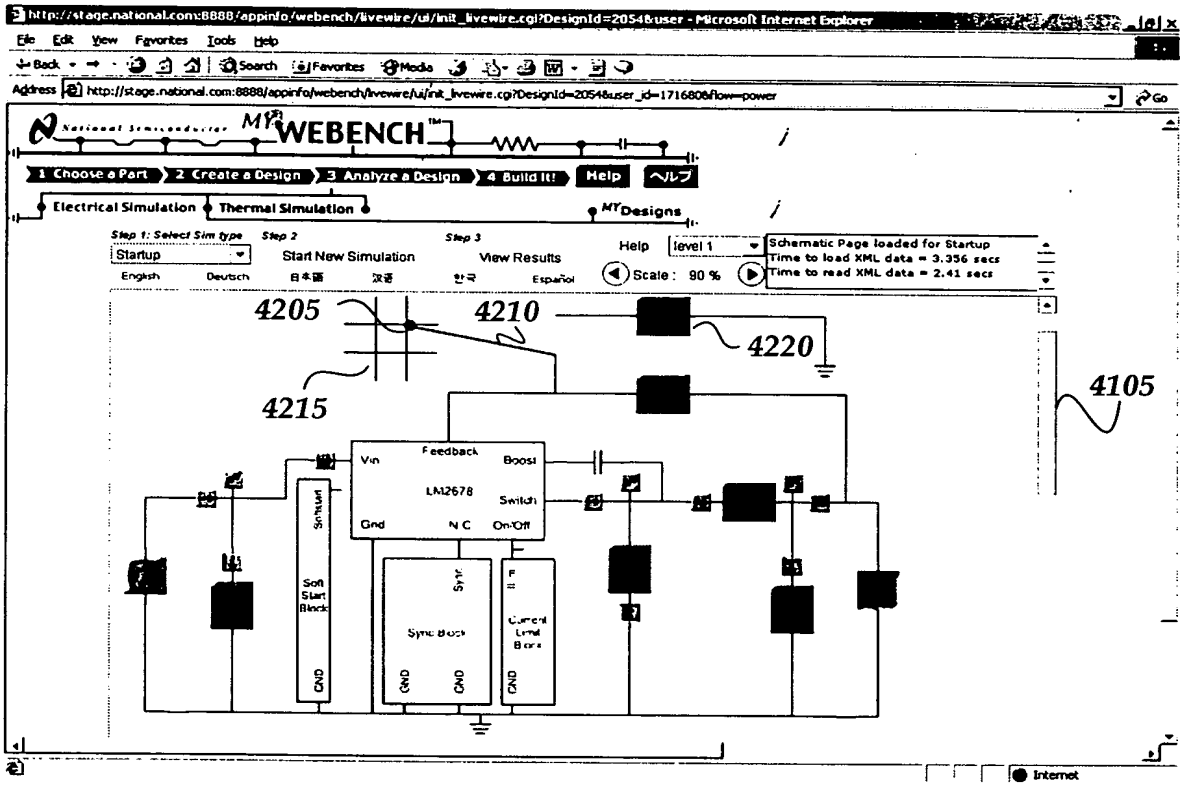

MY WEBENCH
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Help
Electrical Simulation
Thermal Simulation
MY Designs
Startup
Start New Simulation
View Results
Schematic Page loaded for Startup
Time to load XML data = 3.356 secs
Time to read XML data = 2.41 secs
Scale : 90 %
4205
4210
4220
4215
4105
LM2678
Vin
Feedback
Boost
Switch
Gnd
N C
On/Off
Soft Start Block
Sync Block
Current Limit Block
GND
Internet

*Fig.42*

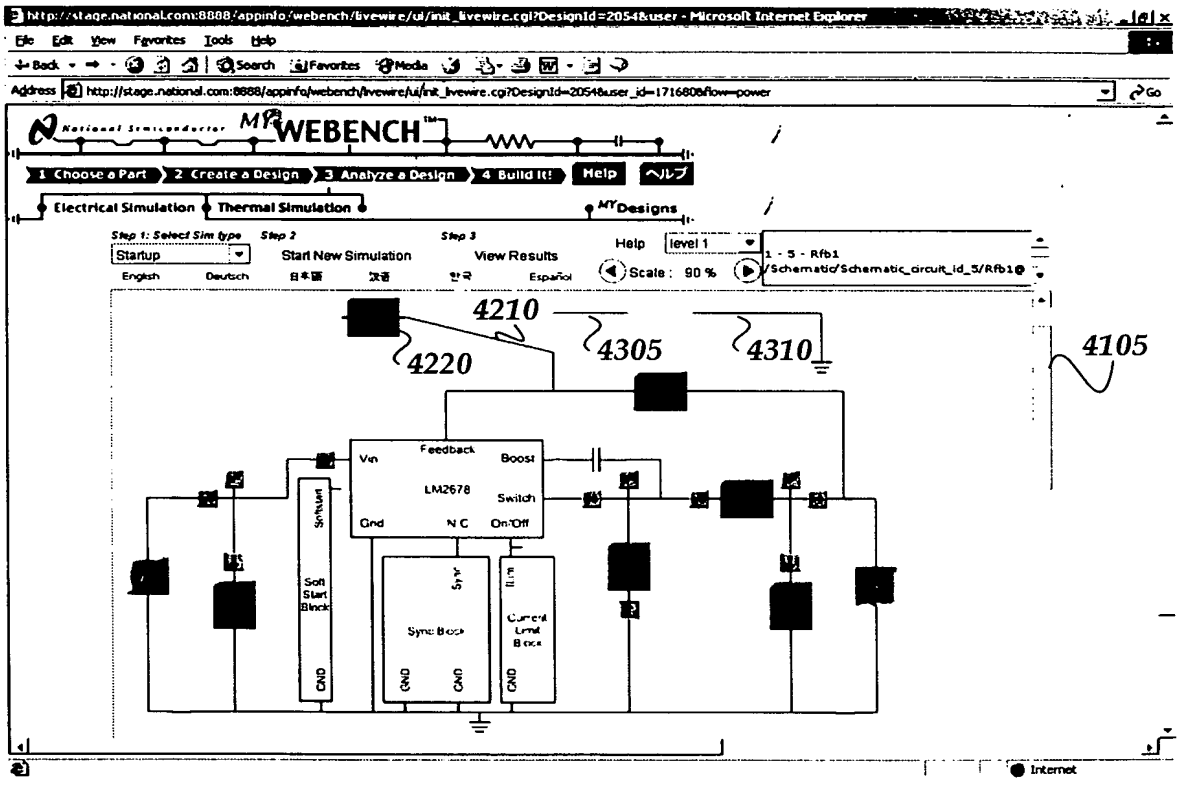

WEBENCH
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Help
Electrical Simulation
Thermal Simulation
MY Designs
Startup
Start New Simulation
View Results
Scale : 90 %
4210
4220
4305
4310
4105
Feedback
Vin
Boost
LM2678
Switch
Gnd
N C
On/Off
Soft Start Block
Sync Block
Current Limit Block
GND
Internet

*Fig.43*

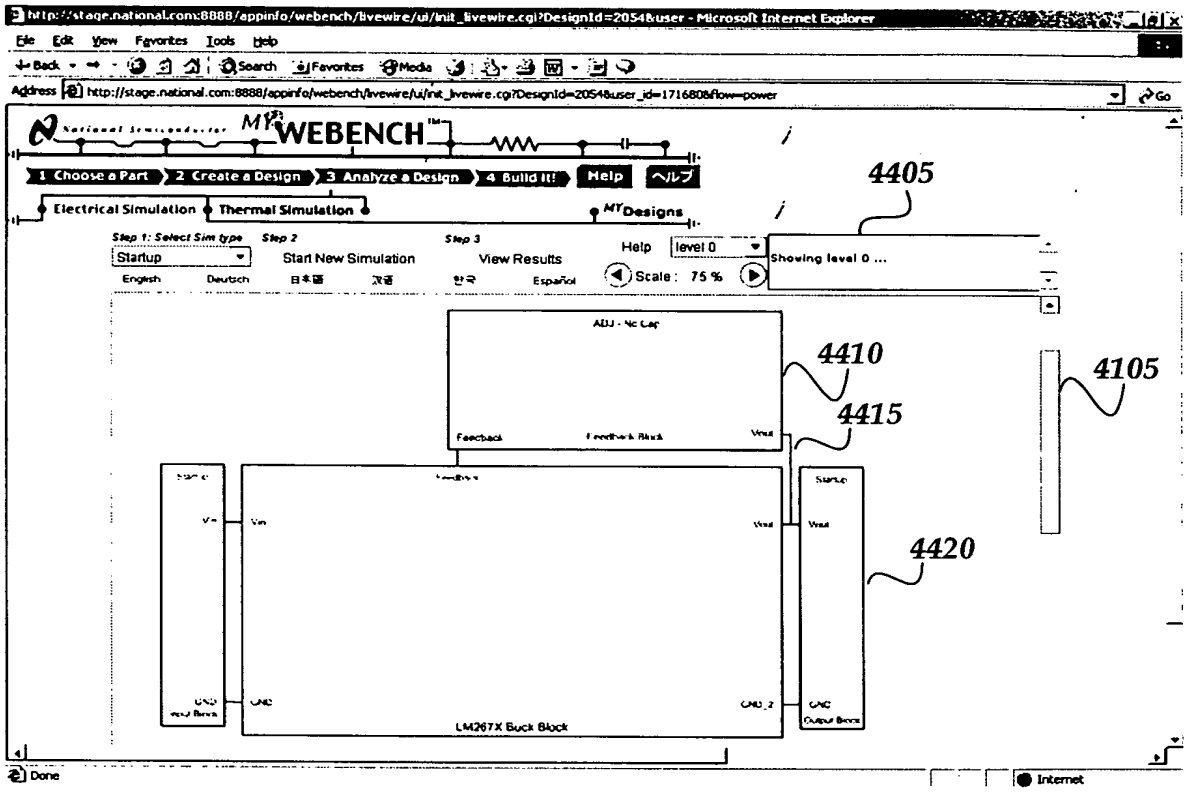

WEBENCH
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Help
Electrical Simulation
Thermal Simulation
Designs
Startup
Start New Simulation
View Results
Scale : 75 %
Showing level 0 ...
4405
4410
4415
4420
4105
LM267X Buck Block
Done
Internet

*Fig.44*

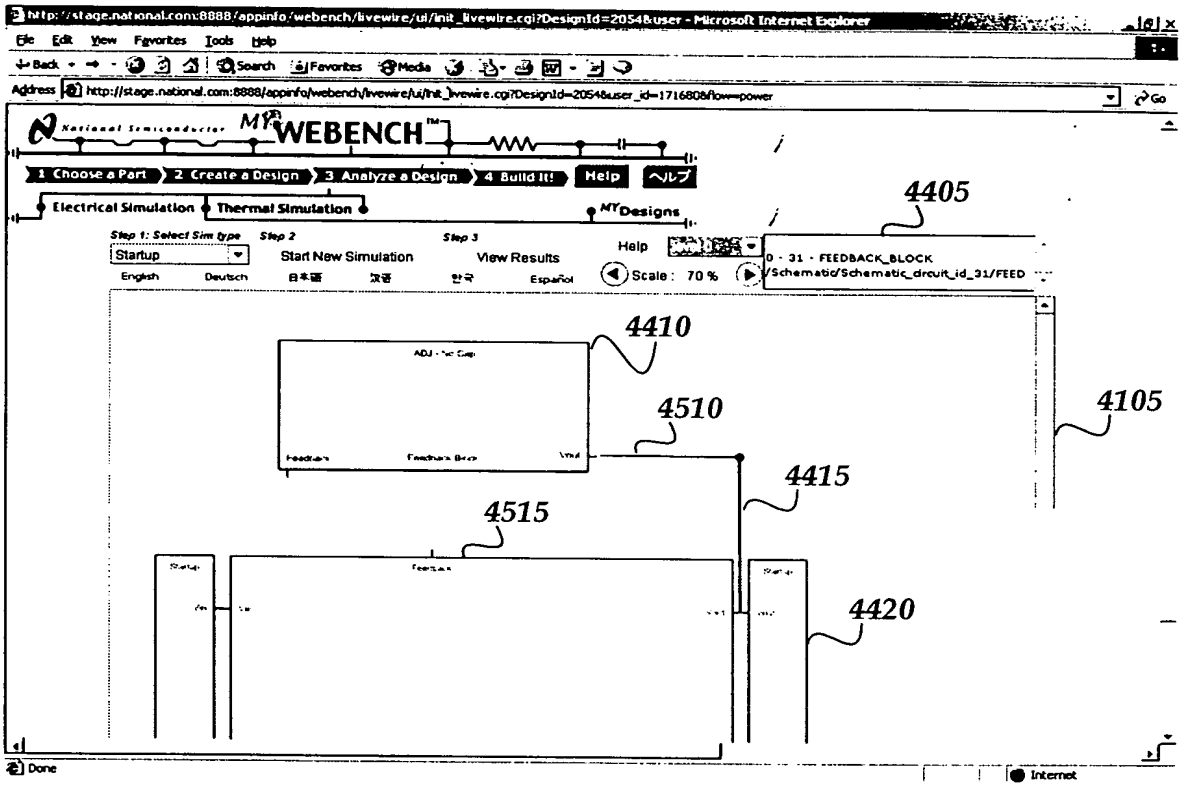

4405
4410
4510
4105
4415
4515
4420
MY WEBENCH
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Help
Electrical Simulation
Thermal Simulation
MY Designs
Step 1: Select Sim type
Step 2
Step 3
Startup
Start New Simulation
View Results
Help
Scale : 70 %
Done
Internet

*Fig.45*

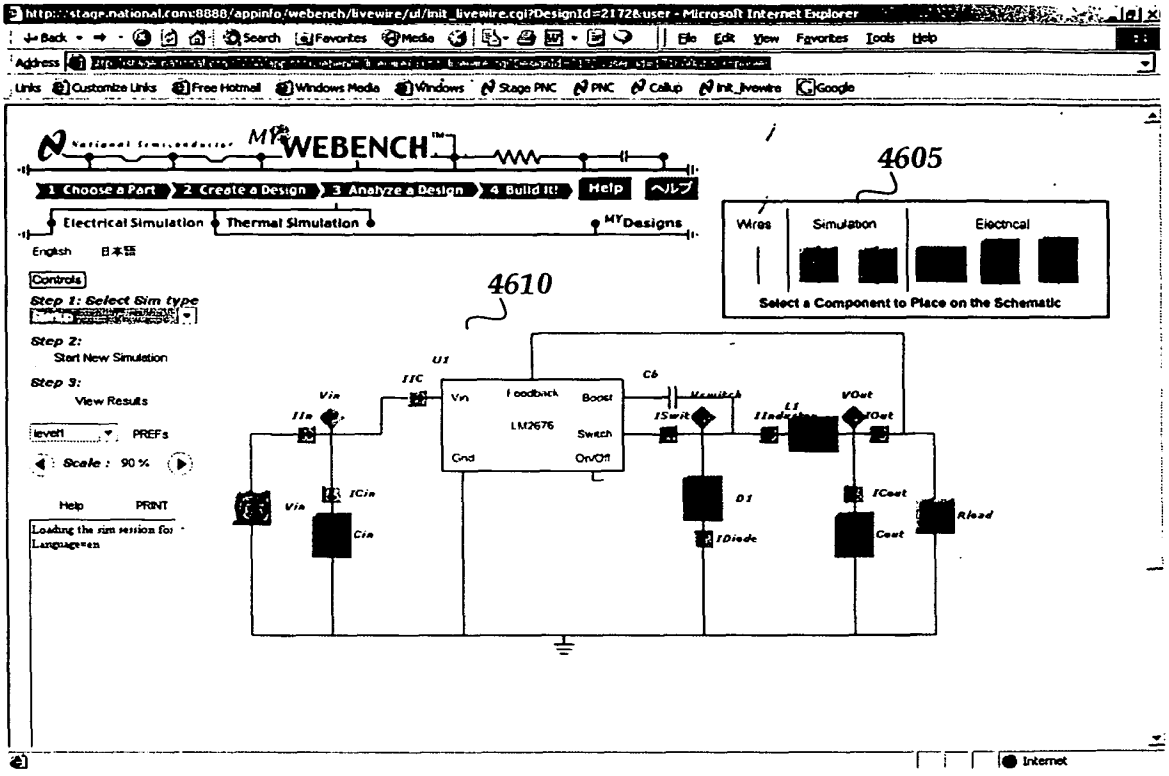

MY WEBENCH
1 Choose a Part
2 Create a Design
3 Analyze a Design
4 Build It!
Help
ヘルプ
Electrical Simulation
Thermal Simulation
MYDesigns
English
日本語
Controls
Step 1: Select Sim type
Step 2:
Start New Simulation
Step 3:
View Results
PREFs
Scale : 90 %
Help
PRINT
4605
Wires
Simulation
Electrical
Select a Component to Place on the Schematic
4610
U1
LM2676
Feedback
Boost
Switch
On/Off
Gnd
Vin
VOut
C6
D1
Rload
Cout
Cin
Internet

*Fig.46*